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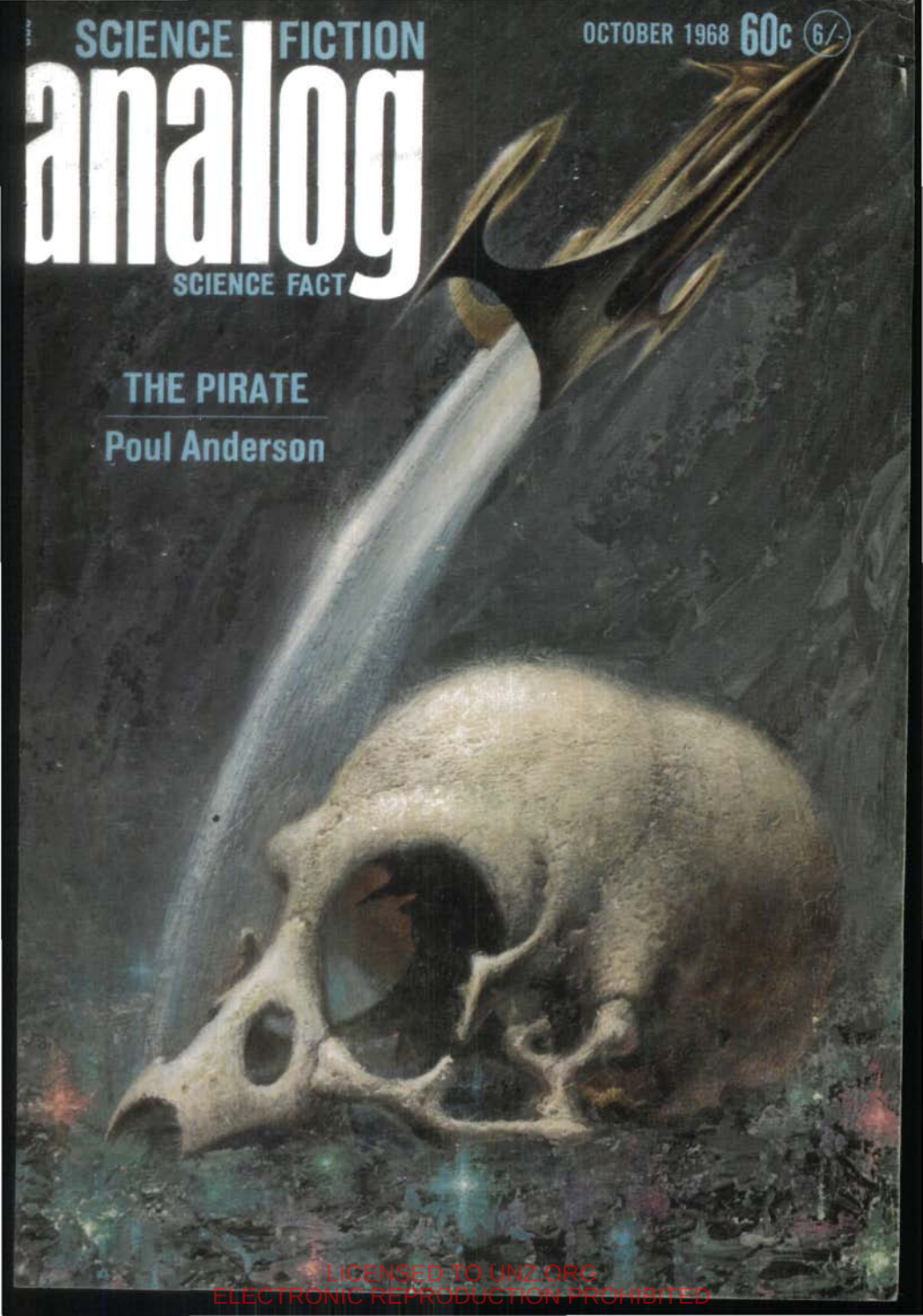

THE PIRATE

Poul Anderson

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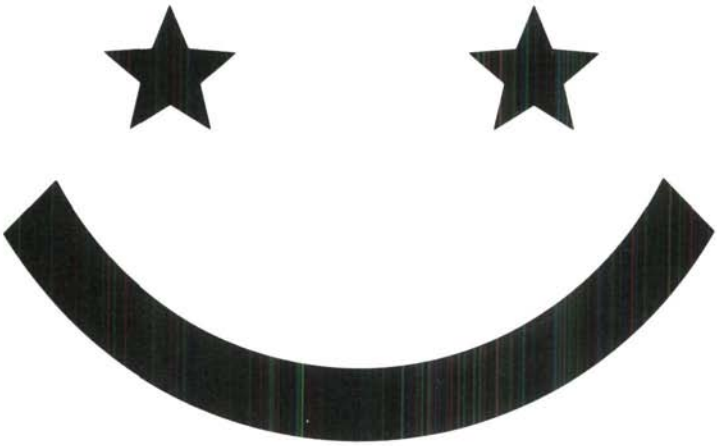

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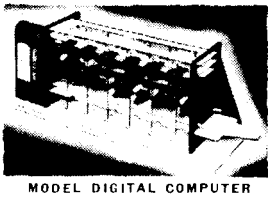

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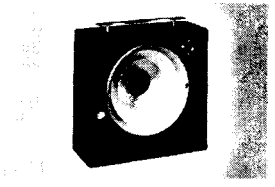

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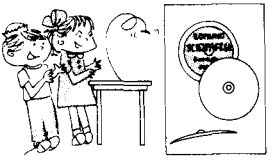

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the paranoid reaction

editorial by John W. Campbell

The Paranoid Reaction—"They're all against me! They're plotting to harm me, because they don't care about me!"—is one of the major phenomena of modern high-density civilization. It's the major background to riots, student rebellion, and the unworkable restrictive laws that make getting most new plans carried out.

It stems, in considerable measure, from the ancient human tendency to hold that any injury or hurt I suffer must be the result of ill will from some outside source. In the most primitive societies, it shows up in terms of malign demons, offended gods, and enemy witch-doctors' curses. The reason the crops failed this year is that the Rain Gods were offended; we must placate them and make sacrifices.

The most effective placation and sacrifice is known as irrigation—and stopping the misuse of lands having only marginal rainfall. Our great plains produced lush crops of buffalo grass—which is a water-conserving plant-form that evolved because of its success in coping with marginal-rainfall plains areas. Tear it out and replace it with high-water-consumption crops like wheat and corn . . . and see, the Rain Gods have turned their ill will upon us! The very land is blowing away into the next state!

When a human being suffers or is injured, he has a very ancient tendency to seek an external target for his vengeance—a fact Shakespeare commented on in "Julius Caesar" with the wry line: "The fault, dear Brutus, lies not in our stars but in ourselves." The Nazis found it much more satisfying to claim that Germany's miseries were the result of evil plotting by the Jews, than to accept, simply, that the world was in an extreme economic mess because of human ignorance and mismanagement of economic systems—that the fault was not malign action, but sheer stupidity.

The automobile safety hurrah set off by Nader's book "Unsafe At Any Speed" produced—incited!—the typical human paranoid reaction. It said: "These flaws exist—*because* the manufacturers are greedy, wicked, and care nothing for others!" This is one of the simplest of all propositions to put over—that someone else is a deliberate source of your ills and hurts.

One of the expectable results of the hysteria that resulted was that manufacturers were compelled by government demand to install im-

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mediately some safety devices that they had had under development—with a consequence any rational engineer could predict. Some of them proved to be decidedly unsafe because of engineering bugs that hadn't been worked out in the normal, time-consuming process of development and testing. Collapsible steering wheels intended to absorb the energy of collision proved to fail dangerously on impact with curbs during bad parking. The hysterical demand for instant action led to dangerous under-engineering.

Which was, naturally, blamed on the "evil" manufacturers, not on the irrational hysteria of the public and the peremptory demands of the government.

Now the public is beginning to be conscious of pollution problems—air pollution in particular, sixty-five percent of which is caused by automobile exhaust fumes. There are loud demands for immedite action on the part of those evil, thoughtless, uncaring manufacturers.

Look, friends, I have a system of pollution control that's guaranteed to reduce pollution from automobiles by seventy-five percent, make cars cheaper, not more expensive, and increase safety. Very simple, and a guaranteed cure.

Simply pass a law that no passenger car be allowed to have an engine of more than twenty horsepower. Gas consumption goes down, cars get lighter, less gas consumption means, necessarily, less exhaust output—it's a sure-fire cure, requiring no extensive research into fume afterburners, catalyst gadgets, or any difficult-to-keep-working devices.

Unfortunately, neither government action, nor manufacturers agreements could put that simple, sane, and excellent solution over. It's not the willful, money-hungry determination of the manufacturers, uncaring in their ruthlessness—"The fault, dear citizen, is not in our cars, but in ourselves."

In addition to the shift-the-blame tendency inherent in *homo sapiens,* there's also the "It must be due to evil motive!" tendency.

One of the few sermons I've ever heard that stuck in my mind was one with a very simple point; the degree to which inanimate objects, by reason of their well-known perversity, can arouse anger in us suggests that it's no great wonder we sometimes become furious at other people: *"Perversity"* of inanimate objects . . .? The term has a semantic loading six feet thick, and dripping with connotations of evil, willfulness, aberrance, and viciousness! Rationally, we're fully aware that inanimate objects, by definition, can't have motivation—yet the term "perversity" carries a heavy assertion that deliberate malignity lurks herein.

Just as you can find expression of human subconscious philosophy in the concepts of demons and evil

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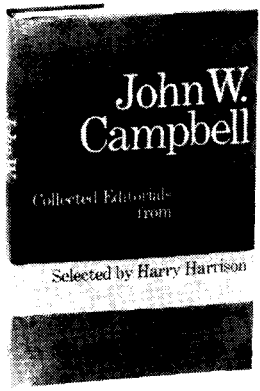

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spirits on which to blame troubles, so, too, can you find a considerable expression of cultural philosophy in legend and myths. What a culture passes on from generation to generation as word-of-mouth tradition must fit well with the basic philosophy of that culture—well enough to seem plausible to the people of that culture.

The Central European and Balkan peoples have a long history of political turmoil, acute mutual distrust, and long-lasting feuds. Their mythology is full of dark and evil entities, dwellers of the night, bearers of infectious evil. The vampire, whose bite can, overnight, turn a trusted friend into an evil blood-drinker of the same Satanic type. The werewolf. Satan lurks everywhere, and the forces of evil are legion.

The Irish have a totally different mythology—although they, too, have shown a long history of mutual distrust and political uproar. The first and last time in Irish history that all the Irish got together in a common cause was under the great Brian Boru, who united them against the Norse, and thus defeated and drove out the invaders.

Yet the Irish, mutually distrustful as their history shows them, have never had the dark and dripping legends the Balkan peoples did.

The Irish fought amongst themselves with good humor, hopeless disorganization, and a spirit of cheerfulness.

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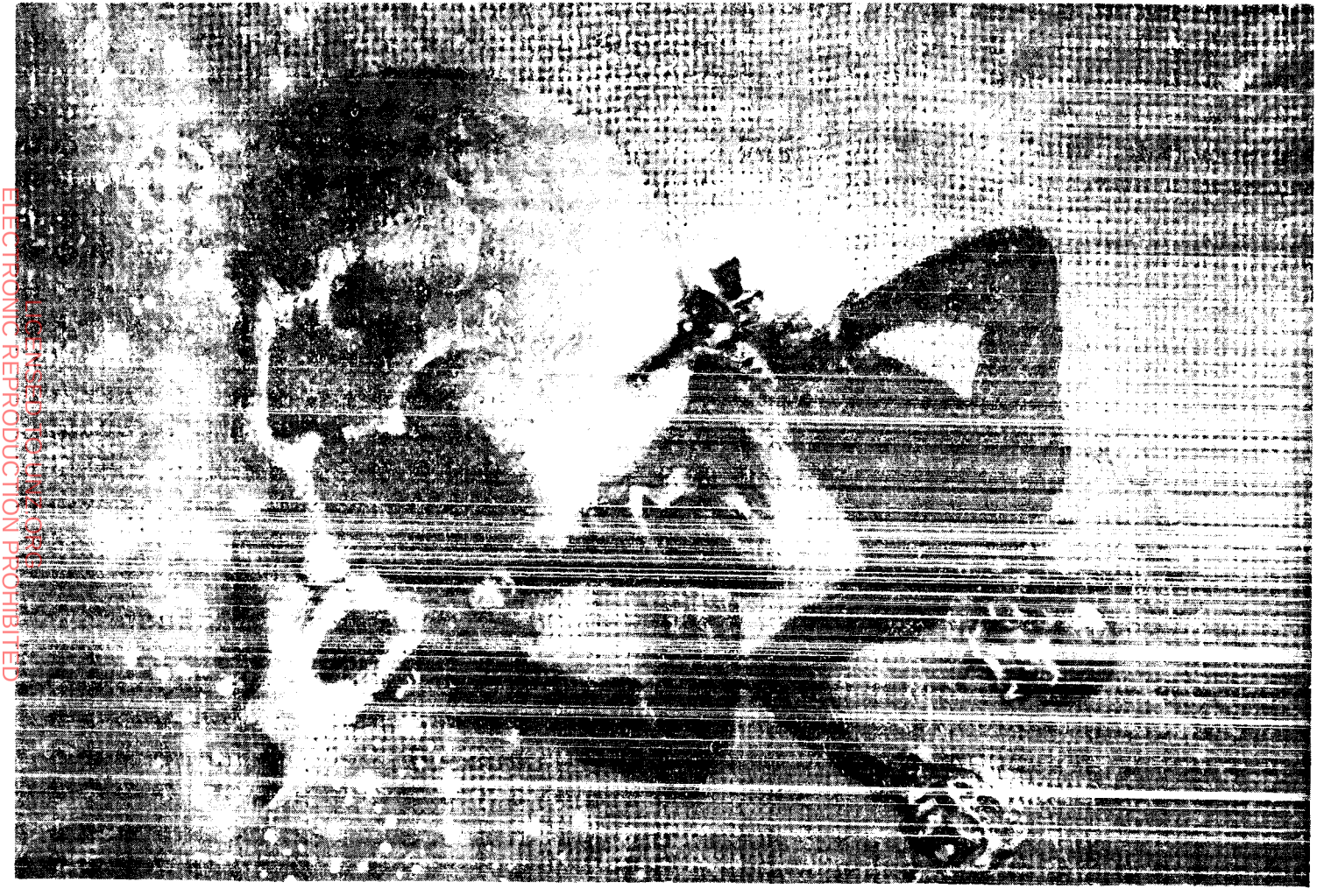

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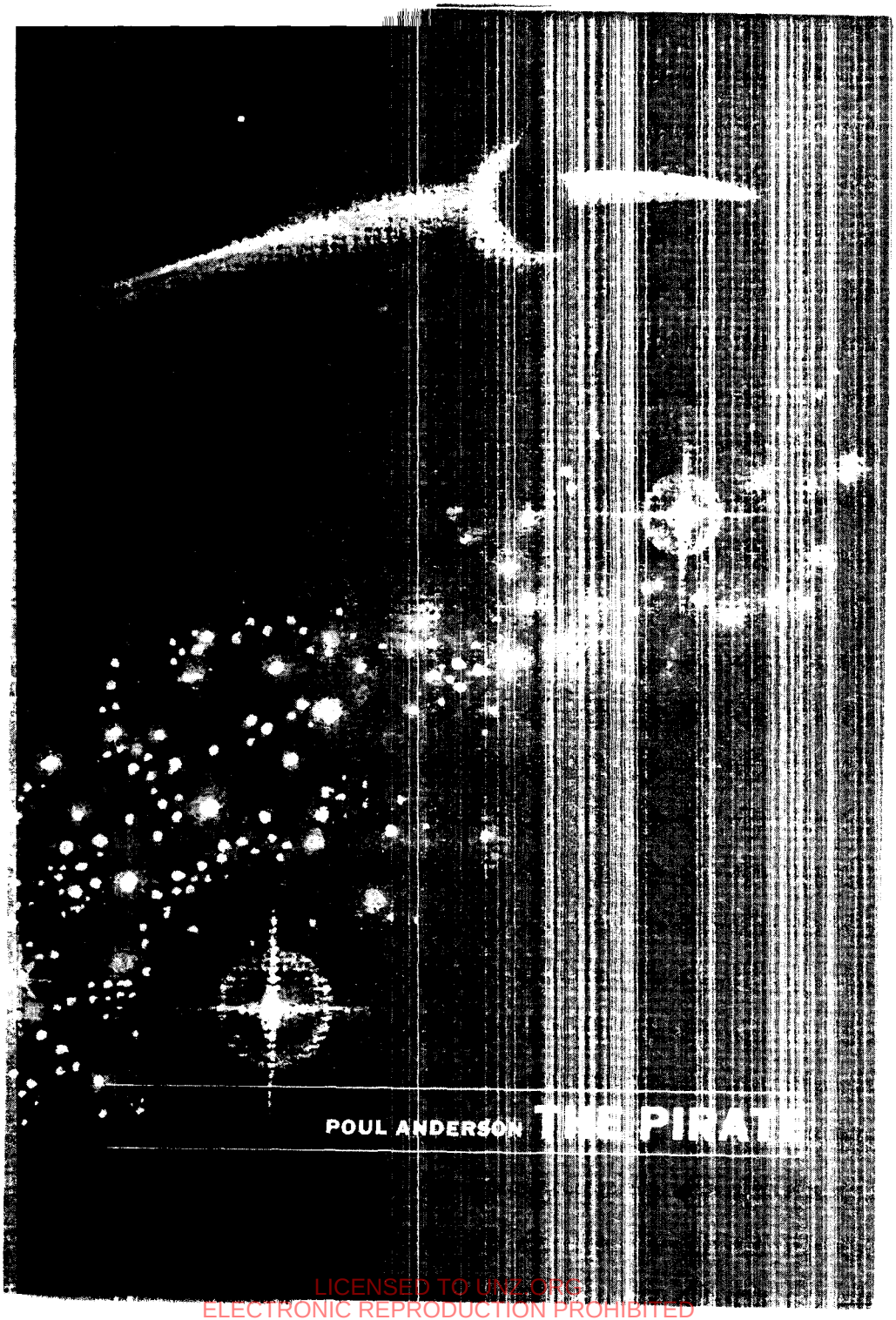

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Robbing graveyards is an ancient practice indeed; the Pharaohs called down curses on such thieves. But never before on this scale . . . !

Illustrated by Kelly Freas

We guard the great Pact; but the young generations, the folk of the star frontier, so often do not understand.

They avail themselves of our ordinary work. (*Ship* Harpsong *of Nerthus, out of Highsky for David's Landing, is long overdue . . . Please forecast the competition which a cybernation venture on Oasis would probably face after the older firms elsewhere learned that a market had been established . . . Bandits reported . . . How shall we deal with this wholly strange race of beings we have come upon?*) But then we step in their own paths and say, "Thou shalt not." And suddenly we are the Cordys, the enemy.

The case of the slain world named Good Luck is typical. Now that the Service is ready, after a generation, to let the truth be known, I can tell you about Trevelyan Micah, Murdoch Juan, Smokesmith, red Faustina, and the rest, that you may judge the rights or wrongs for yourself.

In those days Trevelyan spent his furloughs on Earth. He said its quiet, its intellectuality, were downright refreshing, and he could get all the rowdiness he wanted elsewhere. But of course his custom put him at the nerve center of the Service, insofar as an organization operating across a fraction of the galaxy can have one. He got a larger picture than most of his colleagues of how it fared with the Pact. This made him more effective. He was a dedicated man.

I suspect he also wanted to renew his humanity at the wellspring of humankind, he who spent most of his life amidst otherness. Thus he was strengthened in his will to be a faithful guardian.

Not that he was a prig. He was large and dark, with aquiline features and hard aquamarine eyes. But his smile was ready, his humor was dry, his tunic and culottes were always in the latest mode, he enjoyed every aspect of life.

When the machine summoned him to the Good Luck affair, he

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had been living for a while at Laugerie Haute, which is in the middle of the steep, green, altogether beautiful Dordogne country. His girl of the moment had a stone house that was built in the Middle Ages against an overhanging cliff. Its interior renovation did not change its exterior ancientness, which made it seem a part of the hills or they a part of it. But in front grew bushes, covering a site excavated centuries ago, where flint-working reindeer hunters lived for millennia while the glacier covered North Europe. And daily overhead through the bright sky glided a spear that was the Greenland-Algeria carrier; and at night, across the stars where men now traveled, moved sparks that were spaceships lifting out of Earth's shadow. In few other parts of the planet could you be more fully in the oneness of time.

"You don't have to go, not yet," Braganza Diane said, a little desperately because she cared for him and our trumpeter blows too many "Farewells" each year.

"'Fraid I do," he said. "The computer didn't ring me up for fun. In fact, it's a notoriously sober-sided machine." When she didn't answer his grin, he explained: "The data banks show I'm the only person available who's dealt with, uh, a certain individual before. He's a slippery beast, with sharp teeth, and experience might make the critical quantum of difference."

"It better!" She curbed the tears that could have caused him to think her immature and bent her lips upward. "You will add . . . the rest of this leave . . . to your next, and spend it with me. Won't you?"

"I'd love to," he said, carefully making no promises. He kissed her, where they stood in the hay scent of summer. They went back to the house for a while.

After he packed his kit and phoned good-bye to some neighbors —landholders, friendly folk whose ancestors had dwelt here for generations beyond counting—she flew him to Aerogare Bordeaux. Thence he took a carrier to Port Nevada. The computer had briefed him so well that he could go straight to work, and he wanted to catch Murdoch Juan at ease if possible.

His timing was good. Sunset was slanting across western North America and turning the mountains purple when he arrived. The city walled him off from that serenity as he entered. It shouldered big square buildings above streets in which traffic clamored; the growl of machines perpetually underlay the shrill of voices; frantically flickering signs drowned out the stars; humans and nonhumans hustled, jostled, chiseled, brawled, clashed, stole, evangelized, grew rich, grew poor, came, went, and were forgotten; beneath a tawdry front was that heedless vigor which the cargo ships bring from their homes to enclaves

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like this. Trevelyan allowed himself a brief *"Phew!"* when the stinks rolled around iim.

He knew this town, on a hundred different worlds. He knew how to make inquiries of chance-met drinking companions. Eventually he found one of Murdoch's crew who could tell him where the boss was this evening. It turned out to be no dive, with the smoke of a dozen drugs stinging the eyes, but the discreet and expensive Altair House.

There a headwaiter, live though extraterrestrial, would not conduct him to his man. Captain Murdoch had requested privacy for a conference. Captain Murdoch was entitled to— Trevelyan showed his identification. It gave him no legal prerogative; but a while ago the Service had forestalled a war on the headwaiter's native planet.

Upstairs, he chimed for admittance to the room. He had been told that Captain Murdoch's dinner guest had left, seemingly well pleased, while Captain Murdoch and his female companion stayed behind with a fresh order of champagne, vigorator, and other aids to celebration. "'Come in, come in!" boomed the remembered hearty voice. The door dilated and Trevelyan trod through.

"Huh? I thought you were . . . Sunblaze! You again!" Murdoch surged to his feet. Briefly he stood motionless, among drapes and paintings, sparkling glassware, drift of music and incense. Then, tiger softly, he came around the table to a fist's reach of Trevelyan.

He was as tall, and broader in the shoulders. His features were rugged, deeply weathered, blond hair and a sweeping blond moustache. His clothes were too colorful to be stylish on Earth, but he wore them with such panache that you didn't notice.

The woman remained seated. She was as vivid in her way as he in his, superbly formed, the classicism of her face brought to life by the nearly Asian cheekbones; and she owned the rare combination of pure white skin and fox-red hair. Yet she was no toy. When she saw Murdoch thus taken aback, Trevelyan read shock upon her. It was followed by unflinching enmity.

He bowed to her. "Forgive me if I intrude," he said.

Murdoch relaxed in a gust of laughter. "Oh, sure, sure, Mike, you're forgiven. If you don't stay too mugthundering long." He clapped hands on the agent's shoulders. "How've you been, anyway? How many years since last?"

"Five or six." Trevelyan tried to smile back. "I'm sorry to bother you, but I understand you're shipping out day after tomorrow, which no doubt means you'll be busy for the prior twenty-four hours."

"Right, buck," Murdoch said. "This here tonight is our lift-off party. However, it began with business—lining up a financial backer for later on—so it may as well con-

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tinue that way a few microseconds." The tone stayed genial, but the gaze was pale and very steady. "Got to be business, don't it? You didn't track me down just to wish an old sparring partner a bony voyage."

"Not really," Trevelyan admitted.

Murdoch took his arm and led him to the table. "Well, sit yourself and have a glug with us. Faustina, meet Trevelyan Micah of the Stellar Union Coordination Service."

"Juan has spoken of you," the woman said distantly.

Trevelyan eased into a chair. His muscles relaxed, one by one, that his brain might be undistracted in the coming duel. "I hope he used language suitable to a lady," he said.

"I'm from New Mars," she snapped. "We don't have time for sex distinctions in our manners."

I might have guessed, he thought. There aren't as many unclaimed planets habitable by man as is popularly believed; so the marginal ones get settled too. He could imagine scarring poverty in her background, and Murdoch Juan as the great merry beloved knight who took her from it and would bear her on his saddlebow to the castle he meant to conquer for them.

"I did my duty as I saw it, which happened to conflict with Captain Murdoch's rights as he saw them," Trevelyan said.

"I was making a fortune off fur and lumber on Vanaheim," the other man said.

"And disrupting the ecology of a continent," Trevelyan replied.

"You didn't have to come in and talk them into changing the laws on me," Murdoch said without rancor. He rinsed a glass from the water carafe and filled it with champagne. "Hope you don't mind this being used first by a financier."

"No. Thank you." Trevelyan accepted.

"And then, when he was honorably engaged as a mercenary—" Faustina's tone held venom.

"Bringing modern weapons in against primitives who were no menace," Trevelyan said. "That's universally illegal. Almost as illegal as dispossessing autochthons or prior colonists."

"Does your precious Union actually claim jurisdiction over the entire cosmos?"

"Ease off, Faustina," Murdoch said.

"The Union is not a government, although many governments support it," Trevelyan said to the woman. "This galaxy alone is too big for any power to control. But we do claim the right to prevent matters from getting out of hand, as far as we're able. That includes wrongdoing by our own citizens anywhere."

"The Cordys never jailed me," Murdoch said. "They only scuppered my operation. I got away in

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time and left no usable evidence. No hard feelings." He raised his glass. Unwillingly, Trevelyan clinked rims with him and drank. "In fact," Murdoch added, "I'm grateful to you, friend. You showed me the error of my ways. Now I've organized a thing that'll not only make me rich, but so respectable that nobody can belch in my presence without a permit."

Faustina ignited a cigarette and smoked in hard puffs.

"I've been asked to verify that," Trevelyan said.

"Why, everything's open and honest," Murdoch said. "You know it already. I got me a ship, never mind how, and went exploring out Eridanus way. I found a planet, uninhabited but colonizable, and filed for a discoverer's patent. The Service inspection team verified that Good Luck, as I'm calling it, is an awfully exploitable world. Here I am on Earth, collecting men and equipment for the preliminary work of making a defined area safe for humans. You remember"—his manner grew deliberately patronizing—"check for dangerous organisms and substances in the environment, establish the weather and seismic patterns, et cetera. When we're finished, I'll advertise my real estate and my ferry service to it. For the duration of my patent, I can set the terms of immigration, within limits. Most discoverers just charge a fee. But I aim to supply everything—transportation there, a functioning physical community built in advance, whatever people need to make a good start. That's why I've been discussing financial backing."

"Your approach has been tried,' Trevelyan warned, "but never paid off. The cost per capita of a prefabricated settlement is more than the average would-be immigrant can afford. So he stays home, and puff goes the profit. Eventually, the entrepreneur is glad to sell out for a millo on the credit."

"Not this one," Murdoch said. "I'll be charging irresistibly little—about half what it'd cost 'em to buy unimproved land and make their own homes and highways and such out of local materials. They'll come." He tossed off the rest of his glass and refilled it. "But why are you curious, you Cordys? I haven't told you anything that isn't on file. If you wanted to snoop, why didn't you come see me earlier?"

"Because we have too much else on file," Trevelyan said bitterly. "Our computer didn't get around to correlating certain facts until yesterday. We're trying to keep the galaxy livable, but it's too much for us, too diverse—"

"Good!" Faustina said.

He gave her a grave look. "Be careful, my lady," he said, "or one day a piece of that diversity may kill you."

Murdoch scowled. "That'll do," he said. "I've been nice, but this is my evening out with my girl and

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you're obviously on a fishing expedition. You haven't got a thing against me, legally, have you? Get out."

Trevelyan tensed where he sat.

"Or goodnight, if you prefer," Murdoch said in friendlier wise.

Trevelyan rose, bowed, murmured the polite formulas, and left. Inwardly he felt cold. There had been more than a gloat in his enemy's manner; there had been the expectation of revenge.

It looks as if I'd better take direct action, he thought.

The *Campesino* cleared from orbit, ran out of the Solar System on gravs, and went into hyperdrive in the usual fashion. She was a long-range cruiser with boats and gear for a variety of conditions. Aboard were Murdoch, Faustina, half a dozen spacemen and a score of technicians.

The Service speedster *Genji* followed, manned by Trevelyan and that being whose humanly unpronounceable name was believed to mean something like Smokesmith. To shadow another vessel is more art than science and more witchcraft than either. *Campesino* could easily be tracked while in the normal mode—by amplified sight, thermal radiation, radar, neutrinos from the power plant. But once she went over to the tachyon mode, only a weak emission of superlight particles was available. And Murdoch also had detectors, surely kept wide open.

With skill and luck, *Genji* could stay at the effective edge of the field she was observing, while it masked her own. For this to be possible, however, she must be much smaller as well as much faster than the other craft. Therefore nothing more formidable could be used. She did have a blast cannon, a couple of heavy slugthrowers, and several one-meter dirigible missiles with low-yield nuclear warheads. But Trevelyan would have been surprised if Murdoch's people didn't build huskier weapons en route.

He sat for hours at the conn, staring into the jeweled blackness of its star simulacrum, while the ship murmured around him and the subliminal beat of drive energies wove into his bones. At last he said, "I think we've done it." He pointed to the instruments. A hunter's exultation lifted within him. "They are definitely sheering off the Eridanus course."

"They may have become aware of us, or they may do so later, and attack," replied the flat artificial voice of Smokesmith.

"We take that chance," Trevelyan agreed. "I can't quite believe it of Murdoch, though. He plays rough, but I don't know about any cold-blooded murders he's done."

"Our information concerning his world line is fragmentary, and zero about its future segment. Furthermore, available data indicate that his companions are quite unintegrate."

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"Hm-m-m, yes, hard cases, none Earth-born, several nonhumans from raptor cultures among them. That was one fact which alerted us."

"What else? We departed too hurriedly for me to obtain entire background, I being ignorant of the biological and social nuances among your species."

Trevelyan considered his shipmate. Chief Rodionov had had to assign the first and presumably best agent he could, and there were never many nonhumans at Australia Center. Homo sapiens is a wolfish creature; two of him can end with ripping each other apart, on an indefinitely long voyage in as cramped a shell as this. But even when our agents have gentler instincts, we try to make up teams out of diverse breeds. The members must be compatible in their physical requirements but, preferably, different enough in psychologies and abilities that they form a whole which is more than its parts.

The trouble was, Trevelyan had never before encountered a being from the planet men called Reardon's. He had heard of them, but space is too full of life for us to remember it all, let alone meet it.

Smokesmith's barrellike body stood about one hundred forty centimeters high on four stumpy, clawfooted legs. Four tentacles ringed the top of it, each ending in three boneless fingers whose grip was astonishing. The head was more like a clump of fleshy blue petals than anything else; patterns upon them were the outward signs of sense organs, though Trevelyan didn't know how these worked. Withal, Smokesmith was handsome in his (?) fashion. Indeed, the mother-of-pearl iridescence on his rugose torso was lovely to watch.

The man decided on a straightforward approach. "Well," he said, "the fact that Murdoch is involved was in itself suspicious. He probably came to Earth to outfit, rather than some colonial world where he isn't known, because he wouldn't attract attention."

"I should extrapolate otherwise, when few commercial ventures originate on Earth."

"But the average Terrestrial hasn't got the average colonist's lively interest in such matters. The port cities are mostly ignored by the rest of the planet, a regrettable necessity to be kept within proper bounds. Then too, Murdoch would have a better chance of getting substantial but close-mouthed—uh, that means secretive—money help on Earth, which is still the primary banker of the human species. And finally, though it's true that Service reports from everywhere go to the molecular file at Center . . . that fact makes the data flow so huge that Murdoch might well have completed his business and departed before the continuous search-and-correlation noticed him."

"What was smelled, then, to ex-

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cite suspicion? I do not hypothesize that the initial stimulus was the composition of his crew."

"No. We checked that out later. Nor did the economics of his project look especially interesting. Doubtless his ready-built community will be a wretched clutter of hovels; but *caveat emptor,* he'll be within the law, and word will soon get around not to buy from him.

"No, the real anomaly is the equipment he ordered. The report on this Good Luck of his is complete enough that you can fairly well predict what a ground-preparation gang will need. The planet's smaller than Earth, relatively cold and arid, relatively thin atmosphere. But it has a magnetic field and a weak sun; hence the radiation background is low."

"What is required would depend on what race is to colonize."

"Sure. Murdoch will sell to humans. Not Earth humans, naturally. Colonial ones, from all over. We won't be able to monitor every embarkation and debarkation, any except a tiny fraction. Not when we are as few as we are, with so much else to do. And local authorities won't care. They'll be too glad to get rid of excess population. Besides, most colonials are anarchic oriented; they won't stand for official inquiries into their business." Trevelyan blinked in surprise. "What started me off on that?"

"Conceivably an element of your mentation has sensed a thought."

"If so, it's a hunch too faint to identify. Well. Why doesn't he have waterfinding gear with him, drills and explosives to start forming lakes, that kind of stuff? Why does he have a full line of radiation spotters and protective suits? The biological laboratory he's assembled isn't right for Good Luck either; it's meant to study life forms a lot more terrestroid. I could go on, but you get the idea."

"And now he has changed course." Smokesmith considered the indicators with whatever he used to see. "A geodesic, which will bring him in the direction of Scorpius."

"Huh? You don't have to ask the computer? Trouble is, no law says he must go to his announced destination, or tell us why he didn't." Trevelyan smiled with shut lips. "Nor does any law say we can't tail along."

A keening broke from Smokesmith, made not with his vocoder but with his own tympani. It wavered up and down the scale; a brief shakenness in his nerves told Trevelyan it entered the subsonic. Odors rolled upon the air, pungencies like blood and burnt sulfur and others men do not know.

"Good Cosmos, what're you doing?" he exclaimed.

"It is an old communication of my infraculture. Of whetted winds, frost, a mountain that is a torch, beneath iron moons, a broken night, and the will to pursue that which has poison fangs . . . Enough."

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Five hundred and twenty-eight light-years from Sol, the sky ahead suddenly blazed.

Trevelyan had been meditating upon his philosophy. That, and reading, and listening to music tapes, and tinkering with handicrafts, and physical exercises, had been his refuge from the weary weeks. Smokesmith was a decent being in his way, but too alien for games or conversation. When asked how he passed the time, with no apparent motion save of his endlessly interweaving arms, he replied: "I make my alternate life. Your language lacks the necessary concepts."

The blossoming of what had been merely another, slowly waxing blue star, jerked Trevelyan to alertness. He sat up, clenched hands on chair arms, and stared at the simulacrum until his vision seemed to drown in those glittering dark depths. The star climbed in brilliance even as he watched, for *Genji* passed the wave front of the initial explosion and entered that which had come later. It dominated the whole sky before Trevelyan could shout:

"Supernova!"

And still it flamed higher, until its one searing point gave fifty times the light that full Luna does to Earth, ten million times the light of the next most luminous—and nearby—sun. Although the screens throttled down that terrible whiteness, Trevelyan could not look close to it, and his vision was fogged with shining spots for minutes after the glimpse he had first gotten.

Smokesmith's claws clicked on the deck of the conn section as the Reardonite entered. Trevelyan caught a hackle-raising whiff from him and knew he was equally awed. Perhaps his expressionless phrasing was a defense:

"Yes, a supernova of Type II, if the theoretical accounts I have witnessed are correct. They are estimated to occur at the rate of one every fifty-odd years in the galaxy. The remnants of some have been investigated, but to date no outburst has been observed within the range of recorded explorations."

"We've gone beyond that range already," the man whispered. He shook himself. "Is Murdoch headed toward it?"

"Approximately. No change in course."

"Can't be coincidence. He must have traveled far, looking for game the Cordys wouldn't take from him, and—" Roughly: "Let's get some readings."

Instruments, astrophysical files carried on every Service vessel, and computation produced a few answers. The star was about one hundred fifty parsecs away, which meant it had died five centuries ago. It had been a blue giant, with a mass of some ten Sols, an intrinsic luminosity of perhaps fifty thousand; but the Scorpian clouds had hidden it from early Terrestrial astronomers, and modern scientists

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were as yet too busy to come this far afield.

So wild a burning could not go on for many million years. Instabilities built up until the great star shattered itself. At the peak of its explosion, it flooded forth energy equal to the output of the rest of the galaxy.

That could last for no more than days, of course. Racing down the light-years, Trevelyan saw the lurid splendor fade. A mistiness began to grow, a nebula born of escaped gases, rich in new nuclei of the heavier elements, destined at last to enter into the formation of new suns and planets. Instruments picked out the core of the star: whitely shining, fiercer still in the X-ray spectrum, lethal to come near. But it collapsed rapidly beneath its own monstrous gravitation, to the size of a dwarf, a Jupiter, an Earth. At the end of megayears it would be so dense that nothing, not even light, could leave; and it would have vanished.

Trevelyan said with bleak anger: "He didn't report it. The information that's already been lost as the wave front swelled—"

"Shall we return at once?" the Reardonite asked.

"Well . . . no, I suppose not. If we let Murdoch go, Cosmos knows what deviltry might happen. There'll be other supernovas, but a dead sentience doesn't come back."

"We have a strong indication of his goal."

"What?" Trevelyan set down the pipe he had been nervously loading.

"Examine the photomultiplier screen, and next these." Finger-tendrils snaked across dial faces. "The star to which I point is an ordinary G3 sun within a hundred light-years of the supernova. Proper motions show that it was somewhat closer at the time of the eruption. Our study object is on an unmistakable intercept track. It is plausible that this is meant to terminate there."

"But— No!" Trevelyan protested. "What can he want?"

"The dosage received by any planet of the lesser sun, through the cosmic rays given off by the larger at its maximum, was in the thousands of roentgens, delivered in a period of days. Atmosphere and magnetic field would have provided some shielding, but the effect must nonetheless have been biologically catastrophic. Presumably, though, most lower forms of life would survive, especially vegetable and marine species. A new ecological balance would soon be struck, doubtless unstable and plagued by a high mutation rate but converging upon stability. Probably the infall of radionuclides, concentrated in certain areas by natural processes, would make caution advisable to the present time. But on the whole, this hypothetical planet could now be salubrious for your race or mine, if it otherwise resembles our homes

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sufficiently. I might add that it has been conjectured that accidents of this sort were responsible for periods of massive extinction on numerous worlds, including your own home sphere."

Trevelyan scarcely heard the flat words. All at once he was confronting horror.

When the yellow sun was a disk, too lightful for bare eyes but softly winged with corona and zodiacal glow in a stepdown screen: then the supernova nebula, thirty parsecs off, was only an irregular blur, a few minutes across, among the constellations opposite, as if a bit of the Milky Way had drifted free. One had trouble imagining how it had raged in these skies four hundred years ago. Nor did interplanetary space any longer have an unusual background count; nor did the seven attendant worlds that *Genji*'s cameras identified seem in any way extraordinary.

That was a false impression, Trevelyan knew. Every world is a wilderness of uncountably many uniquenesses. But the third one out, on which his attention focused, resembled Earth.

He was confined to optical means of study. Beams and probes might be detected aboard *Campesino*. Murdoch had gone out of hyper into normal mode several millions of kilometers back. His shadowers necessarily followed suit. Then—lest he spot their neutrino emission, as they were now tracking him by his—they stopped the fusion generators and orbited free at their considerable distance, drawing power from the accumulators.

"The study object is in the final phase of approach to atmosphere of the terrestroid planet," Smokesmith announced.

"I'm scarcely surprised," Trevelyan answered. He looked up from his meters and notes. "Apparently it is as terrestroid as any you'll ever find, too. Air, irradiation, size, mass as gotten from the satellites—nearly identical. Those are two small, fairly close-in moons, by the way; so the tide patterns must be complicated, but the oceans will be kept from stagnation. Twenty-eight-hour spin, twelve-degree tilt. Mean temperature a touch higher than Earth's, no polar caps, somewhat less land area . . . an interglacial macroclimate, I'd guess. In short, aside from pockets of left-over radioactivity, idyllic."

"And possible ecological difficulties," the Reardonite said.

Trevelyan winced. "Damn, did you have to remind me?" He left off peering, leaned back in his chair, held his chin and scowled. "Question is, what do we do about Murdoch? He doesn't seem to have committed any violation except failure to register a discovery. And we probably couldn't prove this isn't his own first time here, that he didn't come this way on impulse. Besides, the offense is trivial."

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"Do methods not exist of compelling humans to speak truth?"

"Yes. Electronic brainphasing. Quite harmless. But our species has rules against involuntary self-incrimination. So it's mainly used to prove the honesty of prosecution witnesses. And as I said, I've no case against him."

"Need we do more than report back? Authorized expeditions could then be dispatched."

" 'Back' is a mighty long ways. What might he do here meanwhile? Of course . . . hm-m-m . . . if Murdoch doesn't suspect we're on to him, he may proceed leisurely with his preparations, giving us a chance to —"

"The study object has ceased to emit."

"What?" Trevelyan surged from his chair. He abraded his arm on his companion's integument, so fast did he brush by to look for himself. The indications were subtle, because the normal neutrino count is always high. But this tracer included a computer which identified engine sign amidst noise and put its volume on a single dial. That needle had fallen to zero.

Chilled, Trevelyan said: "He's going down on accumulators and aerodynamics. By the time we come in range for a different tracking method, he can be wherever on the surface."

Smokesmith's tone was unchanging, but an acrid odor jetted from him and the petals of his face stirred. "Apparently he does not fear detection from the ground. We observe no trace of atomic energy, hence doubtless no one capable of locating it. The probability is that he desires to remove us and none else from his trail."

"Yeh." Trevelyan began to pace, back and forth between the caging bulkheads. "We half expected he'd tag us somewhere along the line, when I'd already put him on the *qui vive* in Port Nevada. But why's he telling us unequivocally that he has?"

"In my race, messages are always intended as vectors on the world line of the percipient."

"In mine, too, sort of." Trevelyan's strides lengthened. "What does Murdoch hope to get us to do by thumbing his nose at us? We have two alternatives. We can go straight back, or we can land first for a closer look."

"The latter would not add significantly to the interval before we can have returned."

"That's the black deuce of it, my friend. The very nearest Service base where we could originate any kind of investigatory expedition is Lir, I suppose, if they aren't still too busy with the Storm Queen affair. There are frontier planets closer than that, full of men who'll gladly swarm here for a chance of striking it rich. And if they can also do the Cordys one in the eye, why, fine."

"Furthermore," Smokesmith

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pointed out, "we have no clear proof that anything is involved sufficiently important to justify a long-range mission. The supernova, yes. That is a scientific treasure. But here we have merely a seemingly uninhabited planet. Why should a base commander who does not know Murdoch's past—especially a nonhuman base commander who cannot ingest its significance—assume he has an unlawful purpose? Will he not expect Murdoch to request an inspection team, that a patent of discovery may be issued?"

Trevelyan nodded. We are scattered so thinly, we who guard the great Pact. Often we must pass by tracks that may well lead toward a hidden evil, because we *know* about another beast elsewhere. Or we learn of something that was wrong at the beginning and should have been stopped, but whose amendment now would be a worse wrong. We have Nerthus, for example, always before us: a human colony founded and flourishing, then learning that native intelligent life did exist. We are fortunate that in that case the interests of the two species are reconcilable, with endless difficulty.

"Does Murdoch wish us to return in alarm bearing data inadequate to provoke prompt official action?" Smokesmith queried. "That seems plausible. Coming as he lately did from the Union's Scorpian march, he must be better informed than we about current situations there. Thus, he might know we can get no help at Lir."

"We can . . . we can even commandeer civilian ships and personnel—if yonder planet has sentient beings on it. Clear and present danger of territorial conquest. Or Murdoch might simply be plundering them."

"It is improbable that such are alive."

"True. If dead—"

Trevelyan stopped. He looked long outward. Unmagnified, the world was a point of light, a clear and lovely blue. But close in would be mapless immensity. The other crew would have had ample chance to conceal their vessel. They could be anywhere, preparing anything. They surely outnumbered and outgunned him. He hated to imagine big, bluff Murdoch Juan as planning murder. On the other hand, Faustina might, and she had had this entire voyage in which to be the only human female . . .

Resolution crystallized. "We're going in," he said.

They approached slowly, both to observe in detail and to make certain preparations. Circling in the fringes of atmosphere, they confirmed the thing they had guessed at.

This had been a peopled world. The people had been slain.

Were there survivors, there would be evidence of them. Civilization might well have gone under

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in mass death, panic, anarchy, and famine after crops perished in fields now brushland or desert. But savage descendants of a city-building race would live in villages. *Genji*'s sensors would register their very campfires. Besides, it was more reasonable that some comeback would have been made, however weak. For the sleet of cosmic radiation harmed no buildings, no tools or machines, no books—little, indeed, except what was alive.

Gazing into a viewscreen, where clouds parted briefly to show high towers by a lake, Trevelyan said: "Populous, which means they had efficient agriculture and transportation, at least in their most advanced regions. I can identify railway lines and the traces of roads. Early industrial, I'd guess, combustion engines, possible limited use of electricity . . . But they had more aesthetic sense, or something, than most cultures at that technological level. They kept beauty around them." He hauled his thoughts away from what that implied. If he did not stay impersonal, he must weep.

"Did they succumb to radiation effects alone?" Smokesmith wondered. He appeared to have no trouble maintaining detachment. But then, he did not feel humanlike emotions, as Trevelyan judged the dead beings had. "Shelter was available."

"Maybe they didn't know about radioactivity. Or maybe the escapers were too few, too scattered, too badly mutated. Anyhow, they're gone—Hold!"

Trevelyan's hands danced over the board. *Genji* swung about, backtracked, and came to hover.

Atmosphere blurred the magnified view, but beams, detectors, and computer analysis helped. A town stood on an island in a wide river. Thus, despite the bridges that soared from bank to bank, it was not thickly begrown by vegetation. What had entered was largely cleared away: recent work, the rawness identifiable. The job had been done by machines, a couple of which stood openly in a central plaza. Trevelyan couldn't spot details, but never doubted they were Earth-made robotic types. Several buildings had been blasted, either as too ruinous or as being in the way, and the rubble shoved aside. He got no indications of current activity, but strong electronic resonance suggested that a modern power network was partly completed.

"Murdoch," Trevelyan said like a curse.

"Can you obtain indications of his ship?" the Reardonite asked.

"No. When he detected us approaching, he must have moved her, and screened as well as camouflaged the hull. Maybe he hoped we wouldn't chance to notice what he's been up to, or maybe this is another gibe. Certainly he must've gotten busy here the instant he landed, after choosing the site on his first visit."

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Trevelyan put the speedster back into orbit. For a while the conn held only a humming silence. The planet filled half the sky with clouds, seas, sunrises and sunsets; the other half was stars.

"No autochthons left," Smokesmith mused at last. "Their relics are of limited scientific interest. Will this be adjudged grounds for sending armed craft, that are badly needed elsewhere, to make him stop?'

"Supposing it is—that's uncertain, as you say, but supposing it is—*can* they stop him?" Trevelyan seized the controls again. The power hum deepened. "Prepare for descent."

He chose a city near the edge of morning, that he might have a long daylight. A mole jutted from its waterfront into an emerald-and-sapphire bay. Sonic beams declared it to be of reinforced concrete, as firm as the day it was dedicated. He landed there, and presently walked forth. A grav sled would have taken him faster and easier, but part of his aim was to get to know somewhat about those who were departed. His ship, all systems on standby, fell behind him like a coppery cenotaph.

He didn't worry about the safety of the environment. Murdoch had proven that for him. What had still to be learned was mere detail: for instance, what imported crops would do well?

Any number, Trevelyan felt sure. It was a rich and generous planet. No doubt it had been more so before the catastrophe, but it remained wonderful enough, and nature was fast healing the wounds.

The bay glittered and chuckled between golden-green hills. At its entrance began an ocean; coming down, he had identified fantastically big shoals of marine plants and animals. No birds rode the wind that rumpled his hair. Most, perhaps all vertebrates were extinct. But lower forms had survived the disaster. Insects, or their equivalent, swarmed on delicate wings that often threw back the sunlight in rainbows. Silvery forms leaped from the water. The wind smelled of salt, iodine, and life.

Overhead wandered some clouds, blue-shadowed in a dazzlingly blue heaven. At this season, the supernova was aloft by day, invisible. Dis-aster, Trevelyan thought with a shudder. How little had Earth's ancient astrologers known of how terrible a word they were shaping!

But the day was sunny, cool, and peaceful. He walked shoreward, looking.

The watercraft had sunk or drifted free of their rotted lines. However, the shallower water inshore was so clear that he could see a few where they lay, somewhat preserved. The gracious outlines of the sailboats did not astonish him; that demand was imposed by natural law. But his eyes stung to think

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that the dead had loved sloops and yawls as much as he did. And they had put bronze figureheads on many, whose green-corroded remnants hinted at flowers, wings, flames, anything fair and free. A large ship had drifted aground. It had been iron-hulled and, judging from the stacks, steam-propelled. But it, no, she had also been designed to look like a dancer on the waves.

He neared the quay. A row of wooden warehouses (?) was partly moldered away, partly buried under vines. Nevertheless he could make out how roofs once swept in high curves that the doorways matched. A rusting machine, probably a crane, was decorated at the end of its lifting arm with a merry animal face.

He stood for some while before an arch at the head of the mole. Here the dwellers had represented themselves.

Their art was not photographic. It had a swing of line and mass that woke a pulse in Trevelyan, it was not quite like anything he had ever seen before. But the bipeds with their long slim six-fingered hands, long necks and long-beaked heads, came through to him as if still alive. He almost thought he could hear their stone cloaks flap in the wind.

Walking further into the city, he began to find their bones.

Carrion eaters had seldom or never disturbed them. Dust blew in, settled on pavement, became soil; seeds followed, struck frail roots that gradually crumbled brick and concrete; bushes and vines grew over that first carpet and up the walls; those kinds of trees that survived extended their range into the domains of trees that had not, and beyond that into farm and town. But the invasion was slow. The wilderness had all the time in the world. It was in full occupation of the shoreward edges of this city, and reducing the next line, but as yet just a few forerunners and—Trevelyan thought with a hurtful smile—sappers had won this near the waterfront.

The buildings of granite, marble, and masonry rose tall, washed by rain and sunlight, little damaged by weather, only occasional creepers blurring their outlines. Like the relief sculpture on their walls, they leaped and soared, not as man-built skyscrapers do but in that peculiar rhythm which made their heights seem to fly. They were colonnaded, balustrated, many-windowed, and kept some of the coloring that once softened their austerity.

Trevelyan wondered at the absence of parks or gardens. His observations from altitude had suggested a deep-reaching love of landscape and care for it. And floral motifs were about the commonest decorations. Well, the dwellers had not been human; it would take long to get some insight into what their

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race psyche might have been. Maybe they enhoyed the contrast of art and openness. If this place was typical, every city was a delight to live in. At some economic sacrifice, the dwellers had avoided filling their air and water with noise, dirt, and poison. To be sure, they were lucky that no heating was required. But as far as Trevelyan had been able to ascertain, industrial plants were widely scattered outside urban limits, connected by railways. There were no automobiles, though that was probably within the technological capabilities. Instead, he found the depictions, and some bones, of large quadrupeds that served like horses; he also identified the hulks of what appeared to have been public vehicles with primitive electric motors. It was hard to tell after four hundred years, but he at least got the impression that, while theirs was a productive and prosperous civilization, the dwellers had not created overly much trash either. They could have foreseen the problem and taken steps. He'd like to know.

Not that they were saints. He came upon statues and dimmed murals which showed combat. Twice, above inscriptions he would never interpret, he saw a being dressed in rags bursting chains off himself; no doubt somebody put those chains on in the first place. But most often he found imagery which he read as of affection, gentleness, work, teaching, discovery, or the sheer splendor of being alive.

He entered courtyards, walked past dried pools and fountains, on into the buildings. Few had elevators, which was suggestive since the culture could have supplied them. He noted that the shafts of the wide circular staircases would easily accommodate grav lifts. The murals indoors were scarcely faded; their vividness took some of the grief off him. Nevertheless, and although he was not superstitious or even especially religious, he knocked on the first door he came to.

Every door was sliding or folding, none bore locks or latches, which again implied unusual traits. The majority of apartments had been deserted. Cloth had decayed, metal tarnished, plaster cracked, and dust fallen centimeters thick. But the furnishings remained usable by humans, who were formed quite like the dwellers. Clean and patch up; restore the water supply; make do with the airily-shaped oil lanterns, if need be, and a campstove since the original owners didn't seem to have cooked anything; throw padding over chairs, divans, beds, intricately grained floors: and you would be altogether comfortable. Soon power would become available, and you could change the place around until it was ideal.

Early in the game, though, you'd better get rid of those pictures, papers, enigmatic tools, and shelvesful of books. They could be disturbing to live with.

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As the hours passed, Trevelyan did find skeletons in a few apartments. Either these individuals had died by surprise, like those he infrequently noticed in the streets, or they desired privacy for their final day. One lay in a kind of chaise longue, with a book upon what had been the lap. Twice he found small skeletons covered by a large one. Did the mother understand that death was coming from the sky? Yes, she could see it up there, a point of radiance too brilliant to look near, surrounded by the auroras it evoked in this atmosphere. Probably she knew that death was everywhere. But she was driven by the instinct of Niobe.

When he discovered the ossuary, Trevelyan decided there must be several, and this was how the average dweller had elected to go. It was in a large hall—theater? auditorium? temple? The most susceptible must already have died, and radiation sickness be upon the rest. In man it approaches its terminus with nausea, vomiting, hair coming out, internal bleeding, blood from the orifices and eyes, strengthlessness, fever, and delirium. Doubtless it was similar for the dwellers.

Outside were the remnants of several improvised coal furnaces. Their pipes fed into the sealed hall, carbon monoxide generators. Bones and rusted weapons nearby suggested the operators had finished their task and then themselves. The door was the single tightly fastened one Trevelyan had encountered, but being wooden it yielded to his boot in a cloud of punk. Beyond lay the skeletons of adults, hundreds of them, and many more young, and toys, games, cups, banners, musical instruments—*I don't know what they did at that party,* Trevelyan thought, *but if we humans had the same guts, we'd tell the children that Carnival came early this year.*

He walked back out into the bright quiet. Something like a butterfly went past, though its wings were fairer than anything evolved on Earth. Being a little of an antiquarian, he said aloud: "The Lord giveth and the Lord taketh away; I will not bless the name of the Lord. But I will remember. Oh, yes, I will remember."

He had not gone much further toward the middle of town when he heard a thunder rumble. Looking up past the towertops, he saw the great shining form of *Campesino* descend. She came between him and the sun and covered him with her shadow.

Reflexively, he took shelter in a doorway. One hand dropped to his pistol. With a sour grin at himself, he activated the tiny radio transceiver in his tunic pocket. On the standard band, he heard Murdoch's voice: "Cordy ahoy! Respond!"

The empty speedster made no reply. A drone and a quivering went through the air as *Campesino* balanced on her gravs.

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"You!" Murdoch barked. "We picked up your tachyons halfway to here. We followed you down by your neutrinos. Don't try bluffing us about having a friend in reserve. You're alone, and we've got a cyclic blast zeroed in, and I want to speak with you."

More silence in the receivers. Trevelyan felt the sweat on his ribs, under his arms, and smelled it. He could not foretell what would happen. At best, he had sketched behavior patterns Murdoch might adopt and responses he might make. His plan amounted to creating a situation where he could improvise—whether successfully or not.

A barely distinguishable background growl: "No one inside, I'd guess. Exploring the city?"

"Could be," Murdoch said. "Odd they'd leave their boat unguarded."

"A trap?"

"Well—maybe. Don't seem Cordy style, but maybe we better keep clear."

Trevelyan did in fact wish *Campesino* to set down elsewhere, making *Genji* less of a hostage. He decided to push matters, trod forth and shot a flash from his gun into the air. It crackled. Ozone touched his nostrils.

"Look! Below! You, do you read us?"

Trevelyan saw no sense in giving away the fact that he could listen. He might gain some slight advantage thereby; and Cosmos knew, with that metal stormcloud hanging above him, he needed whatever help he could get. He waved and jogged off toward the city center, where he had noticed a plaza from above.

After a conference he couldn't make out, the others did what he would have done in their place. *Campesino* opened a hatch and discharged a grav sled with a man or two aboard. Not carrying missiles, she could give them no effective armament. But they would hover near *Genji* and cry warning of anything suspicious. The ship herself dropped behind the towers. When she landed, the ground trembled and echoes boomed slowly from wall to wall.

Trevelyan switched off his radio speaker, turned on the transmitter, and hastened his trot. Once he accidentally kicked a skull. It rolled aside with a dry clatter. *I'm sorry*, he thought to it. That being not altogether alien to him had felt this street underfoot, sunwarmth reflected off cataractlike facades, muscle movement, heartbeat, breath. The city had lived around the being, with friends, loves, traffic, music, pleasure . . . did the race laugh? *I may be joining you soon*, he added, and scorned himself for the juvenilism.

He emerged not on a square but a golden rectangle. Grassy growth was thrusting up and apart those blocks which had paved it, but the rains of four centuries had not quite

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washed out the grooves worn by generations of feet. The enclosing buildings were lower here. Their lines bespoke tranquility rather than excitement, though three of them held the fragments of dazzling stained-glass windows. Numerous skeletons lay prostrated before one. *Campesino* rose brutal from the plaza center.

Several men and not-men waited, guns at the ready. They were a hard-looking gang. Murdoch stood at ease. Faustina tensed beside him. Both wore black coveralls with silver ornamentation. Her hair glowed in the light. Trevelyan approached at a reduced pace, hands well away from his pistol.

"Mike!" the adventurer bawled. He threw back his head in laughter that made his moustaches vibrate. "Why the chaos didn't I expect you'd be the one?"

"Who else with you?" Faustina said.

Trevelyan shrugged. "Who with you?" he countered.

"You've seen our roster," Murdoch said. "I figured you'd refuse to board, afraid we'd grab you, so I came out." He jerked a thumb at the sheer hull behind. "Got a full complement inside at alert stations."

Trevelyan achieved a smile. "What makes you expect trouble, Juan?" he asked in his mildest voice.

Murdoch blinked. "Why . . . you dogged us clear from Earth—"

"No, think," Trevelyan said. "Space is free. The Coordination Service investigates where it can, but forbids violence to its agents except under extreme necessity. You know that as well as I do."

The guards around shifted stance, muttered among themselves, flicked eyes from side to side. Trevelyan virtually felt the unease in them.

"For example," he drawled, "You're breaking the law here, first by not reporting a discovery—"

"We've only just made it!' Faustina said. Red stained the white cheekbones. Her fists were clenched. He studied her for a moment, thinking with compassion: *She's afraid I'll take away her glory —her chance to rake in money until she can lose the fear of being poor that was ground into her,* and with caution: *In an aggressive human personality, fear begets ruthlessness.*

"Please let me finish," he said. "I'm not interested in lodging charges, nor would my superiors be. The offense probably occurs hundreds of times a year, and seldom matters. Out of necessity, the Service operates on the old principle that the law should not concern itself with trifles."

She stepped back, breathing hard, lips pulled away from teeth, but plainly bemused. Murdoch's massive features had grown immobile. "Continue," he said.

"You've committed a more im-

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portant breach of law by tampering with and destroying material of scientific value." Trevelyan kept his tone amiable and a faint smile on his mouth. "I refer to that island city. But the planet is such an archaeological and biological Golconda that we'll overlook your indiscretion, we'll put it down to an amateur's forgivable enthusiasm, in exchange for the service you've done to civilization by bringing this world to our knowledge. You'll remember an agent like me has authority to issue pardons in minor cases. I'll write you one today, if you wish, and recommend you for next year's Polaris Medal into the bargain."

He offered his hand. "Stop worrying," he said. "Let's have a drink and go home together."

Murdoch did not take the hand. The big man stood for a while, staring, and the silence of the dead grew and grew. He broke it with a whisper: "Are you serious?"

Trevelyan dropped pretense. He said in a hardened voice, while his nerves felt the surrounding guns: "It's an honest offer. You already have Good Luck to make your living off. Be content with that."

"Good Luck?" Faustina cried. She swept one arm in a taloned arc. "You idiot! *This* is Good Luck!"

"I kept hoping it wasn't," Trevelyan said low.

"What do you figure I had in mind?" Murdoch demanded.

"Obvious," Trevelyan sighed. "Here was your real discovery. But how to exploit it? You couldn't get a patent, because the Union would forbid colonization until the scientists finished their researches. Considering the distance, and the shortage of personnel, and the vast amount there is to study, that would take at least a hundred years, probably longer. In fact, the odds are we'd put a secrecy seal on the coordinates for a decade or two, to keep unqualified visitors away until a big enough enterprise got started and the scientists could do their own guarding."

"Scientists!" Faustina nearly shrieked.

"What a means to a fortune, though!" the coordinator said. "You could offer an utterly desirable home, complete with every facility for hundreds of millions of people, at a price the ordinary colonial can afford. You stood to become one of the wealthiest humans that ever lived.

"Well, you went looking for a world we wouldn't disallow. What you turned up isn't particularly good. But it's no worse than some which have been settled, and at least doesn't have a population already squeezing its meager resources. People would buy your real estate there, if the preliminary work had been done for them and the cost was not beyond their means.

"Some you actually would take to the marginal planet—say when

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an agent like me happened to be around. You'd lose money on them. But it wouldn't matter, because most would be shipped here, where entire cities cost you practically nothing. They'd write home. Your ships would carry the overjoyed mail, maybe censoring it a wee bit to keep us Cordys from getting wind of your enterprise too soon. Not that we'd be likely to, when we're run off our feet with urgent cases, and when few people on those thousands of entire worlds give us any active cooperation. You could carry on for a number of years, I'm sure, before the discrepancies got so glaring that we investigated."

"What'd you do after you learned?" Murdoch asked.

"Nothing," Trevelyan said. "How could we displace tens of thousands, maybe millions of men, women, and children, who'd come in good faith, started a good new life, put down roots, begun bringing forth a new generation? It'd be a political impossibility, a moral one, maybe a physical one. They'd fight for their homes, and we couldn't bomb them, could we?

"You personally would be subject to—in theory, confiscation of your properties and imprisonment of your body. In practice, you'd have put both where we couldn't touch them without more effort and killing than it was worth. You'd have rigged the colonial government and its constitution early in the game to make you something like the Founding Father president of Good Luck. They'd fight for you, too. So, rather than violate its own prohibition on conquest—for the sake of scientific and aesthetic values that'd already been ruined—the Union would accept what you'd done to it."

Trevelyan closed his mouth. He felt hoarse and tired and wanted a smoke, but didn't dare reach for his pipe under those guns.

Murdoch nodded. "You read me good." He chuckled. "Thanks for the Founding Father title. I hadn't thought of that. Sounds like what I need."

"I can't allow it, you know," Trevelyan said.

"Why not?" Murdoch grew curiously earnest. "What's here, really? A worldful of bones. I'm sorry it happened, but dead's dead. And they were, well, one more race among millions. What can we learn from them that matters? Oh, I suppose you can hope for a new technique or art form or whatever, that'll revolutionize civilization. But you prob'ly understand better than me how small that chance is. Meanwhile, yonder we've got people who're alive, and hurting, now."

"The planet will be opened for settlement, region by region, in due course."

"How long is due course? How many'll die during it, that could've lived happier?"

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"Emigrants are always replaced at home by fresh births. In the long run, the exact time of migration makes no difference."

"Forget the long run and think about flesh and blood."

Trevelyan's anger broke his control. "Don't hand me that guff, Murdoch," he snapped. "You're about as altruistic as a blast cannon."

"And you," Faustina spat, "you're a machine. I look forward to killing you—dismantling you!"

"Wait, wait, there," Murdoch said. "Ease off and let's talk sane."

He regarded the ground for a moment before he straightened, faced Trevelyan squarely, and said:

"I'll tell you how it lies. When we knew we were being dogged, we decided to lead you on, because once the supernova got reported, this sector would be swarmed and somebody else might find our Good Luck.

"You could've skitted for home without landing. If you'd done that, we'd've made for the nearest human planets to here. We'd've rallied a lot of men, transported 'em free, gotten well dug in before you could raise any action at headquarters. It might've been enough to stop you from doing anything."

"I assumed that was your plan," Trevelyan said. "On my way back, I'll visit every Scorpian world and announce, without specifying location too closely, that this planet is interdicted to preserve cultural

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values. To come here then, knowingly, will justify and require violence by the Service. We do have to maintain the precedent."

"What makes you think you're going back?" asked Faustina. She grinned with hatred.

"Ease off," Murdoch repeated. To Trevelyan: "I did hope you'd land, like you have. Waved a large red flag at you, didn't I? You see, I knew you must have less beef than my ship. Now I've got you."

"What will you do with me?" the coordinator replied.

"Well, uh, I'll admit some of my mates got a little, uh, vehement," Murdoch said. "But I don't see any point in killing you. I sure don't want to. You're not a bad osco, Mike, for a Cordy. And they can't have any idea on Earth which way we headed. I'm not about to return there: I've done my credit arranging. If they ask me about you later on, why, I never had any notion you were trying to follow me. You must've come to grief somehow, and I'm awful sorry. Maybe I'll use your boat to fake some clues."

His mask of bashfulness fell away. He beamed. "Tell you what, Mike," he said. "Let's find you a nice island out in mid-ocean. We'll leave you tools and supplies and show you what's safe to eat. You Cordys are supposed to be philosophers. You should be glad of a few years for thinking. If you want, I'll try to get you a woman. And soon's I can, I'll flit you to our spaceport we'll've built. How's that for a fair proposition?"

Trevelyan savored the breath he drew, the light he saw, the will rising within him like a physical tide. "Let me be sure I understand you," he said. "Do you seriously intend to maroon me in order that I won't report the facts of this case?"

"Too good for you," Faustina said. "But if Juan's that tender-spirited, yes."

"Do you realize that this involves grave violations of personal integrity?" Trevelyan asked. "Do you realize that it involves direct interference with an officer of the Union in the performance of his duty?"

Murdoch flushed. "Your duty!"

"I demand you let me go back to my spacecraft and depart unmolested," Trevelyan said.

Faustina snickered.

"You will not?" Trevelyan asked. He waited. A breeze whispered.

"Very well," he said. "I can now testify under brainphasing that you are guilty of attempted crimes sufficient to justify your arrest. Will you come quietly with me?"

"Have you lost your orbit?" Murdoch exclaimed.

"Since you resist arrest in addition," Trevelyan said, "the necessity of applying force becomes incontestable."

The guards jabbered, swore, and brought their weapons to bear. Faustina hissed. Murdoch's hand streaked to his own pistol.

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Trevelyan ostentatiously folded his arms and said: "If my Service does not respect your rights, civilization is worthless. But civilization has rights of its own. I admit I led your thoughts away from my partner"—he heard a gasp and an oath —"but that scarcely constitutes entrapment. He's under a roof in this city, on an accumulator-powered grav sled, along with several nuclear missiles. Through a miniradio in my pocket, he's been listening to our conversation. If you don't surrender yourselves, he'll destroy you."

He paid scant attention to the uproar of the guards. His focus was entirely on their leaders.

Murdoch yanked a transceiver from his jacket to speak an order.

"Give them a demonstration, Smokesmith," Trevelyan said.

No one saw the torpedo rise. It went too fast. Momentarily the sky was bedazzled with hell-colored flame. Concussion smote, not unduly hard from that altitude, but it shook men where they stood and bellowed in their ears. The bones before the temple shuddered.

"A bit close," Trevelyan said. He was aware that his own body quivered and went dry in the mouth. A remote part of him decided this was an unintegrate reaction and he needed more training. Speech and reasoning mind, though, were steel cold. "We may want antirad shots. I think you'll agree, Juan, the next can drop right here. Afterward my Reardonite friend won't have trouble picking off your watchmen."

"You'll be dead, too," Murdoch groaned.

"I don't want to be," Trevelyan said, "but rather more is at stake than what I want."

Faustina whipped around behind Murdoch. She snatched his gun from the holster, flung herself forward and rammed the muzzle into Trevelyan's belly. "Oof!" he choked. *I don't exactly cut a heroic figure, do I?* flashed through him. *But the beings here only had what dignity they could make for themselves, after heaven's meaningless anger fell on them.*

"I'll kill you myself!" she raved.

He knew tricks for knocking the weapon aside and taking it from her. But others were trained on him. He met her eyes, from which the tears went flooding, and said: "If you do, why should my partner not destroy you?"

Murdoch wrenched the gun from her. She raked at his face. He knocked her down. Panting, sweat a-river on his skin, he said: "What do you want?"

"If you know something about Reardonites," Trevelyan said, and saw that Murdoch did, "you realize it won't bother Smokesmith to annihilate me along with you. But he agrees it's undesirable. So is the destruction of this beautiful plaza. Let's compromise."

"I asked what do you want, you devil?"

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"Safe conduct back to my vessel. Smokesmith will monitor me by radio. Your ship will stay put. At the first sign of any ill faith whatsoever, he shoots. At worst, you see, he must eliminate both ships and hope this world gets rediscovered by someone who'll respect it. Once aloft, I'll quickly drop down again and pick him up, too quickly for you to rise. At that point you'll be helpless, but have no fears. With a head start and a faster craft, I'll be on the frontier planets before you, issuing prohibitions. No one's going to follow you when he knows it'll bring warships down on him. I suggest you find a place and lie low."

Murdoch beat fist into palm, again and again. For a minute he looked old and hollowed out.

Then his mirth awoke. "You win this 'un too, Mike," he said. "I'll escort you to your boat personal. Here." He offered his pistol. Trevelyan accepted it.

Faustina sat up. A bruise was spreading on her slim jaw where her lover's fist had smitten. She looked at them both, through tears and matted locks, and was no longer anything except a bewildered beaten child.

"Why?" she pleaded. "Why can't we have a patent—when w-w-we found the supernova for you? You'd do this—wreck everything—for two, three hundred s-s-specialists . . . and their *curiosity?*"

Trevelyan hunkered down before her. He took both her hands in one of his. The other pointed around, ending at the temple. "No," he said most gently. "For these. Have they no rights? That someone shall come to know them, and they won't be lost from us."

But she did not understand. We guard the great Pact, which is the heart of civilization, of society, and ultimately of life itself: the unspoken Pact between the living, the dead, and the unborn, that to the best of poor mortal abilities they shall all be kept one in the oneness of time. Without it, nothing would have meaning and it may be that nothing would survive. But the young generations so often do not understand. ■

THE ANALYTICAL LABORATORY

JULY 1968

PLACE	TITLE	AUTHOR	POINTS
1.	Satan's World	*Poul Anderson*	1.62
2.	Hawk Among the Sparrows	*Dean McLaughlin*	1.98
3.	Null Zone	*Joe Poyer*	3.49
4.	Winkin', Blinkin' and R^2	*R. C. FitzPatrick*	3.62
5.	To Sleep, Perchance to Dream	*W. C. Francis*	4.27

THE EDITOR

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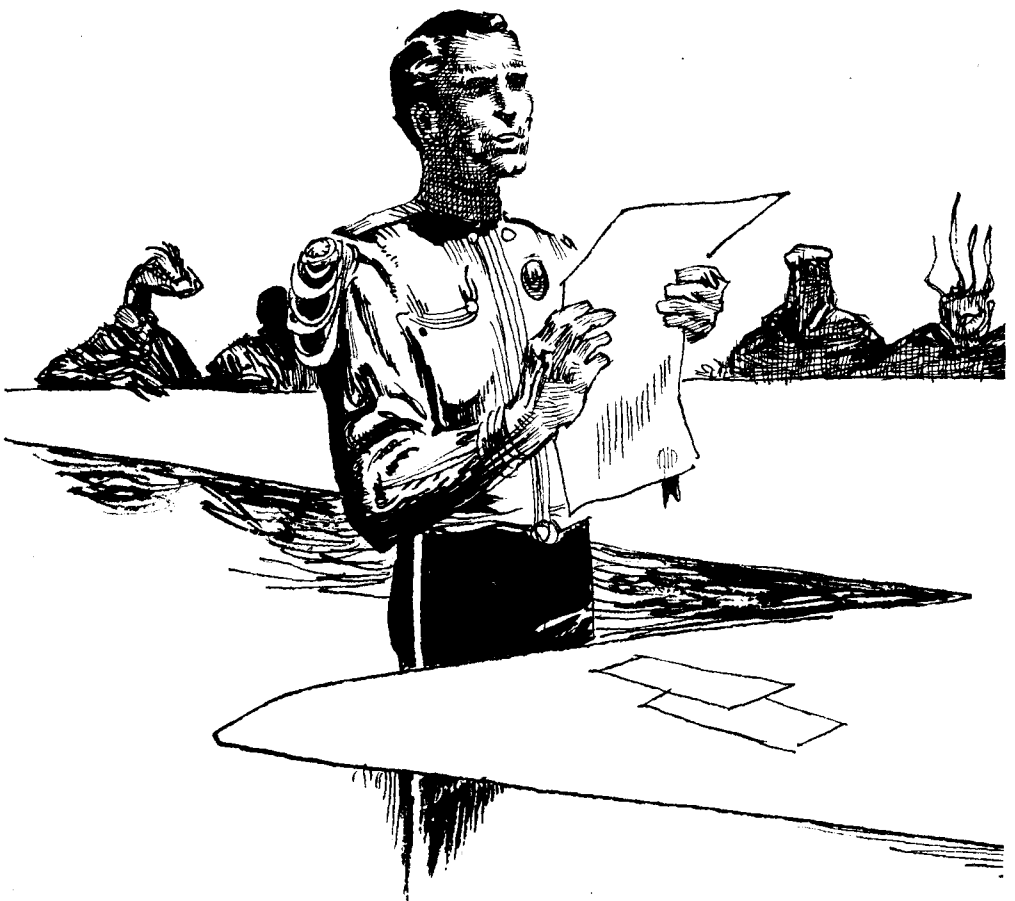

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Christopher Anvil

MISSION OF IGNORANCE

There are some circumstances where not honesty, but ignorance, is the best—and only workable!—policy.

Illustrated by Leo Summers

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Second Lieutenant Jack Smith, at attention before the weird-looking entities, asked himself why *he* had to represent Earth at this second visit of the Galactics. Their first visit, marked by a jovial presentation of gifts, had been handled by the highest officials on Earth.

Across the legless table that hung before them with no visible support, the Galactic Emissaries appeared to be pondering the same question. The one seated directly before Smith, more or less human in appearance, and acting as spokesman, made a throat-clearing noise. His voice was extremely cold.

"Excuse me if I seem repetitious. Did you say you were a *messenger* from the Earth representative? Or are you some kind of functionary attached to his staff?"

"I *am* the Earth representative."

"I find that difficult to understand."

Smith was inclined to agree, but there was no use dwelling on that. He considered his scant but explicit instructions, and said, "I have written authorization to that effect."

"I suggest you show it."

"I will show you my authorization, *if you show me yours.*"

The asininity of this was clear to Smith, who didn't know two words in any Galactic tongue. But—He had his orders.

The Galactic spokesman stared at him a moment, then acquired a peculiar inward-turned expression, as if he were trying to remember a long-forgotten name. At the same time, the Emissary's lips moved, very slightly, and Smith had the eerie sensation that the Emissary was talking to someone inside of his head. The Emissary looked sharply at Smith, turned away, and called over his shoulder. From behind one of the curved gray screens, that blocked Smith's view of whatever was in back of the Galactics, came a respectful low-voiced reply.

The spokesman put his hand behind the screen, then placed on the floating table a thing that looked like a small book, followed by what appeared to be a strip of cellophane tape, then a child's block with rounded corners and edges, two dominoes of varying colors and designs, and several pieces of thick paper covered with symbols suggestive of Egyptian hieroglyphics. The Emissary turned toward Smith, and made a slight bow. He spoke ironically:

"Here is our authorization. Please feel free to satisfy yourself that everything is in order."

Smith took a brief look at the things. "I'm prepared to take your word for it." He reached into the inside pocket of his jacket, selected the first of three long envelopes, took from it a crisp white sheet of paper, checked to be sure it *was* his authorization, and handed it over. As he stood waiting, Smith was again struck by the farcicality of giving a second lieutenant the job

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of representing the planet. There must be *some* reason for it. But what? And why hadn't it at least been explained to him before he was sent here?

Meanwhile, the Galactic, on looking over the authorization, frowned in irritation, and turned it around.

Smith, faintly puzzled at this error, said politely, "You've got it upside down."

The Emissary changed expression, swung around in his seat, called to someone behind the screen, and handed the paper back out of sight. He turned back toward Smith with a cold stare, then sat looking once more like someone intently trying to remember a forgotten name.

Smith studied the Galactic's face. At first, his lips seemed to be moving, very slightly. Then the motion vanished. The Galactic glanced sharply at Smith.

From behind the screen came a click and a snap, then a puzzled voice.

The Galactic reached back, dropped the paper before him on the desk, and looked flatly at Smith.

"What language is this?"

"English."

"You lie."

Smith stiffened, then remembered he was supposed to be a diplomat.

"You are mistaken."

The Galactic held out the paper.

"Suppose you read this to us."

Smith turned the paper around, and read:

"To whoever it may concern: This is to certify that Jack Smith, Second Lieutenant, E. S. C. F., is duly, officially and in accord with all relevant usages and requirements, appointed Representative of the Special Governing Council of Earth, for the purpose of meeting, consulting with, and carrying out any necessary preliminary negotiations with, the entities known as Galactic Emissaries . . ."

Smith read through to the end, lowered the paper, and directly opposite him, the spokesman for the Galactic Emissaries was looking at him with a distracted expression.

Exasperatedly, Smith asked himself, Now *what? Why that look? It was a simple matter of reading what was written, wasn't it?*

The Emissary leaned forward. "May I see that paper again?" After looking at it, he folded it vertically down the center, so only one side was visible at a time.

"Please read the left side, half-line by half-line, from top to bottom; then turn the paper over and read the other half-lines, on the right side."

Frowning, Smith began to read. This, he decided, must be a check, to make sure he actually *was* reading. If, for instance, he had spoken from memory, he would now have the problem of mentally dividing the remembered words into as many groups as there were lines of words on the paper, then dividing

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each group of words roughly in half, and then calling off all the left halves in order, followed by all the right halves. Happily, since he *was* reading it, his only problem was an occasional word or phrase cut apart by the fold in the paper.

When Smith finished, a low voice spoke from behind the screen.

The Emissary looked at Smith wonderingly.

"This, then is written in some form of . . . ah . . . official cipher-script?"

Smith looked blank. Apparently someone hidden behind the screen had checked, and found that he'd read the authorization correctly. Nevertheless, the Galactic Emissary seemed almost as much in the dark as Smith himself. Smith looked at him wonderingly.

"It's just standard shorthand."

The Emissary jumped as if someone had touched him with a hot wire.

"Shorthand?"

"Yes."

Smith looked around in amazement.

This harmless comment had created the same effect as a sackful of snakes turned loose at a garden party.

When the clack and jabber finally died down, the renewed quiet was again broken as all the pale-green strands crowning the head of one of the Galactics rose up on end and vibrated with a shriek. Meanwhile, the spokesman was saying anxiously to Smith, "This . . . shorthand . . . is it just taught to a few men selected for the . . . ah . . . diplomatic corps, or is it taught *widely?"*

Smith stared at him. "It's taught widely. Why not?"

The Emissary didn't answer, but turned to talk earnestly to several of the others. When eventually this came to an end, he looked back at Smith.

"Our computer didn't recognize this . . . ah . . . shorthand. This document, then, is written in a formerly obscure form of shorthand?"

Smith thought it over. It was just standard everyday shorthand. But wait a minute now. It was sometimes called "Burdeenite Fastwrite." And the Burdeenites hadn't come into existence till *after* that first visit of the Galactics.

"Not obscure, but fairly new," said Smith. "New, that is, since your previous visit."

This created a scene like chickens in a henyard when a rat runs through.

Frowning in perplexity, Smith reminded himself of the size of the huge Galactic ship, and how it hung easily clear of the ground, its huge mass supported on nothingness. The power represented by this ship was self-evident. Yet, the Galactics themselves were thrown into confusion by a few scratches on paper. Why?

The spokesman was suddenly

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silent, his head oddly tilted. Then he spoke very firmly to the others, and faced Smith.

"If this paper is in a script unknown to us, how are we supposed to *read* it? And if we cannot read it, how do we know what you have said is true?"

And, thought Smith, considering that the Galactics *wouldn't* be able to read it, why had his superiors sent him with it in the first place? He shrugged and thought over his instructions: "If they refuse to accept your authorization, open the *second long envelope,* and take out Sheet One."

Smith felt in his pocket, and drew out the second long envelope. He got out Sheet One, unfolded it, and found that it was the same authorization, but in ordinary print. He handed it to the spokesman of the Galactics.

Why, he exasperatedly demanded of himself, *hadn't he just been given* that paper to *hand over, to begin with?*

The spokesman looked up,

"This authorization for Lieutenant Jack Smith appears to be in order. However, we have no proof that you *are* Lieutenant Jack Smith. Kindly let us see your identification."

Smith perfunctorily slid up the curving zipper on the left sleeve of his battle jacket, undid the button of his left uniform cuff, and turned the sleeve back to reveal, apparently either tattooed or indelibly stamped, a blue-outlined oblong on the inside of his left forearm, bearing the name "Jack Smith" and several groups of smaller letters and numbers.

There was a stunned silence.

The spokesman sat back, and said dazedly, "I see."

Smith, baffled, rolled down his shirt sleeve, buttoned it, and ran the zipper back down the sleeve of his battle jacket.

He was gradually coming to feel as if he were serving as a stand-in in some kind of alien poker game, laying down cards passed to him by the real player, who was out of sight. It was supposed to be just a friendly little game, but actually everyone in it was out for blood, and every play had implications that he couldn't fathom.

Around him, the gigantic ship clicked and murmured, while the Emissaries, as if they had just been dealt some unexpected and formidable rebuff, sat around in a daze. Finally they roused themselves, exchanged brief low-voice comments, and glanced almost fearfully at Smith. The spokesman finally drew a deep breath.

"Ah . . . On mature consideration, Lieutenant Smith, we feel that, while you evidently *are* the Earth representative, still, out of respect to your own highly-esteemed planet, we feel that someone of higher rank and greater experience should be sent here, to deal with

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the weighty problems that may arise."

Smith nodded agreeably. That certainly was what *he* thought. However, his instructions on this particular point were perfectly simple. He reached in his pocket, reopened the second long envelope, and got out Sheet Two.

Sheet Two proved to be folded around a somewhat smaller envelope, with unequivocal instructions written on the face. Smith read the instructions; then, feeling foolish, he opened the envelope, shook out a little plastic bag, and stuck it temporarily in a side pocket. He unfolded a long sheet of thick paper adorned with seals, crests, silver and gold ribbons, official stamps, and illegible signatures over imposing titles. There were also three blank spaces for him to sign, so, resting the paper on top of the envelopes, he got out a pen and scrawled his name in the blank spaces. He then handed the paper to the Emissary, put the envelope away, and methodically got out the little plastic bag.

The Emissary, meanwhile, stared at the paper.

Smith tore the end off the plastic bag, shook out a kind of bronze X, a glittering silver circle, and a crown-shaped pin set with tiny rubies and diamonds. One by one he pinned these emblems onto his uniform jacket, then dropped his gold bars into the plastic bag, and put it away. He was still the same person, but no one in any of Earth's armies would have known it.

The Emissary looked up from the paper.

"So, this document, when signed, gives you the temporary rank of Field Marshal, Member of the Special Governing Council of Earth, and Prince Imperial of the Royal and Imperial House of Mogg?"

"That's what it says," said Smith. He was unenthusiastically aware that he had just experienced the first half of the most meteoric rise and fall in Earth history. The paper specified that his rank lasted while he was on the Galactic ship—and was revoked as soon as he set foot on Earth again.

"Why," asked the Emissary, "didn't they send someone of this rank in the first place?"

"I don't know."

"Why, if they were going to give you this rank, didn't they give it to you before you came on board?

"I don't know that, either."

The Emissary showed a glint of frustrated peevishness.

"Why, exactly, *did* they send *you?*"

Smith said irritatedly, "Don't expect *me* to read their minds."

This, after it was out, had a hint of an insubordinate tone that Smith wasn't happy about. It also seemed to stun the Galactics.

Yet again, Smith was treated to the sight of a collection of alien entities, with few familiar features

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to judge by, somehow projecting an appearance of disordered stupefaction. And the spokesman once more looked as if he were earnestly trying to remember a forgotten name.

Finally, down the table, an entity that resembled a set of joints of bamboo, of various lengths and diameters, topped by a kind of flattened giant clamshell, bestirred itself, opened the clamshell a crack, and emitted a series of grating squeaking noises.

The spokesman seemed to receive some message from this, cleared his throat, and said something over his shoulder.

After a moment, there was a murmured reply.

The Emissary turned to Smith.

"I don't believe we have heard before of the Royal and Imperial House of Mogg."

Smith doggedly got out the third envelope. As the Galactics watched anxiously, he drew out a large folded sheet of paper marked "Env. 3, Sheet 2, and read aloud the first sentence:

"The House of Mogg is one of the many startling results of the precedent-shattering first visit of the Galactic Emissaries."

Smith paused, and glanced at them, wondering if this simple comment would have any effect.

The Emissaries showed a variety of expressions, which ranged from resignation to faint hope.

Second Lieutenant Smith read on:

"The House of Mogg, closely allied to the Burdeenite and certain other faiths, controls roughly one-fourth of the land surface of the Earth, and possibly one-tenth of its populace. It is headed by a monarch whose actual name is unknown, the name 'Mogg' having been adapted in the early days when the Burdeenite faith and allied political movements were outlawed.

"The main distinguishing characteristic of the House of Mogg is its unalterable opposition to the use, within its own territories, of the remarkable gifts presented by the Galactic Emissaries during their First or Preliminary Visitation.

"These gifts, by the widespread and unselfish use of which the fitness of Earth to join the Greater Galactic Community is to be decided during the Second or Determining Visitation, include:

"1) The marbus plant. This plant is pest-free, and hardy in all but the most extreme polar regions. All parts of it are tasty and nutritious. It is prolific and fast-growing, requires little care, and may be grown in a variety of forms, depending on cultural practices. The effect of the marbus plant, properly used, is to enormously increase food production, thus offering the total elimination of famine at the present population level.

"2) The drug popularly known as 'Superpill.' A minute quantity of this drug, taken orally, permits

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family planning, with no known side effects, for up to two years at one dosage. The effect of this drug is to permit easy stabilization of the population at current levels.

"3) The 'condensed-circuit' computer. This device, based on the 'polyphase crystal,' provides an unprecedented number of switching elements per unit volume, at extremely low power-drain. The computer is composed of two basic parts, the 'crystal' and the 'control.' The crystals were grown originally from seed crystals provided by the Galactics, in baths prepared according to their instructions. The controls are manufactured according to the Galactic patterns. The precise mechanism by which the condensed-circuit computer operates is, for Earth scientists, still a matter of conjecture, although it has been suggested that the control, by a very rapid three-dimensional scanning process, alternately determines, and detects, certain finely-balanced fundamental properties of the individual atoms of the polyphase crystal. The practical effect of this very compact low-drain computer has been to obsolete all former computer technology, enormously accelerate already-existing trends in industrial and transportation control, and revolutionize many phases of human activity, including education. With the aid of a pocket-sized, relatively inexpensive computer, a child of eight can now easily perform abstruse calculations far beyond the skill of the professional mathematician of pre-Visitation days. Dates and events of history are readily available from the computer, as are chemical and physical facts in enormous abundance. By proper use of the computer, numerous relationships between seemingly isolated facts can readily be discovered. Hence the new computer has come to be a tool of thought comparable to the old-time 'slide rule,' but on a far greater scale, and, for this reason, much present-day education is actually training in the skillful use of the condensed-circuit computer.

"To all of these developments, the House of Mogg, and the Burdeenite and allied faiths, are unalterably opposed. In their territory, former types of computer and control devices are in use, and undergoing continuous and rapid development; old-style Earth plants provide food; and the 'superpill' is banned on pain of death.

"The Burdeenite territories have highly irregular borders, and many are seemingly-indefensible enclaves. But they are not molested. Following the original secession of the Burdeenites, the Governing Council strove to compel obedience by force, and strengthened its human combat forces with newly-developed unmanned combat-machines controlled by their own internal computers, and programmed to track down and destroy armed rebel forces. The Burdeenites

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argued that they themselves were fighting for the cause of humanity against 'alien-inspired devices', and refused to fire on human troops unless seriously attacked. The combat machines, not yet perfected, malfunctioned, and committed a series of incredible atrocities against both sides, with the result that the human combat forces went over to the Burdeenites *en masse*. The Governing Council, fearful to commit its remaining troops, agreed to a prolonged truce, during which it rapidly developed improved combat-machines.

"During this truce, however, large numbers of engineers, scientists, and technicians, disliking the trend of events, joined the House of Mogg. They were at once put to work in the industrial and research facilities under Burdeenite control. The cause of what happened next is a state secret of the House of Mogg, but the outer facts are clear enough.

"The Governing Council, determined to bring the Burdeenite regions back under control, worked to create formidable forces of improved and thoroughly tested types of combat-machines. The Burdeenites labored to multiply and strengthen their fortifications, and to create a unified industrial whole of many of the regions under their control. Both sides were apparently successful.

"The Governing Council then delivered an ultimatum, on the rejection of which the Council attacked, using tremendous concentrations of combat-machines in the effort to achieve a quick and decisive victory. The result was a smashing success of the Burdeenites on all decisive fronts, the combat machines being somehow destroyed in enormous numbers. In the resulting sudden peace, the Burdeenites exacted only modest territorial gains, insisting instead on their religious, intellectual and political freedom. This peace has proved durable.

"The Burdeenite territories offer numerous perplexing features to the outsider. One is the incredible depth and strength of the fortifications, the works often completely concealed by remarkable skill in camouflage. These fortifications, though formidable beyond belief to the outsider, and stocked with enormous quantities of food and other supplies, never satisfy the Burdeenites, who labor constantly to further strengthen and improve them, though no enemy is in sight.

"Another baffling feature is the paradox, frequently seen in Burdeenite territory, of advanced research and development carried out along lines already eclipsed by the Galactic gifts. A related feature is 'backsearch'—research to uncover *past* methods and devices, already eclipsed by Earth's own progress; such discoveries are greeted with as much rejoicing as completely new facts, methods,

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and devices; the Burdeenites do not necessarily place even the most antique device, for instance, in a museum, but study its principle, and often improve the device *along the lines it would naturally have followed if new methods had not displaced it.* Peculiarly enough, some of these antique devices have been improved to such an extent that they have returned to daily use even *outside* Burdeenite territory. The achievement of such a feat is always cause for a patent of nobility in the House of Mogg.

"These eccentricities have proved valuable to the Burdeenites, in that an enormous trade in novelties has sprung up. The Burdeenite 'Never-smoke Catalytic Long-Burning Efficiency Lamp,' for instance, is an extremely popular item, because of its intriguing design, and also because of its surprising effectiveness as a portable emergency light source. Numerous Burdeenite-invented games, such as 'Bash,' 'Guerrilla,' and the ever-popular, 'Invasion From Outer Space,' enliven interests dulled by excessive leisure. A peculiar feature of this last named game is that it has grown into a cult, and its devotees actually stock many of those goods and devices that might be useful in an actual 'invasion from outer space.'

"To the Burdeenites and their curious ways must also be credited the development of Fastwrite, the standard shorthand now taught in grade school, which for many uses has displaced the somewhat cumbersome computerized Voice-print based on Galactic technology.

"Government in the Burdeenite territories rests largely with the House of Mogg. As nearly as an outsider can comprehend, the House is a nonheredity monarchy and aristocracy, with a minimum of laws. One oddity is that property taxes increase when property value is permitted to decline. Another is that the Chamber of Confusion, or Legislature, is permitted to put only a certain fixed number of laws on the books. Beyond that number, a previous law must be revoked, or somehow consolidated with others, for each new law added. No new or changed law can become effective until it passes examination by the Board of Dunces, a seven-member panel whose function is not to pass on the *fitness* of the law, but on its comprehensibility; the Board of Dunces is made up entirely of men with no legal training.

"The House of Mogg, and the Burdeenites, represent a curious development in Earth history. While incomprehensible by ordinary standards, their influence, despite the amusing eccentricity of their ways, cannot be denied."

Smith finished the paper, turned it over, folded it up, slid it into its envelope, and put it away. Then he looked up.

The Galactic Emissaries were sit-

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ting there like so many vegetables.

Finally, the spokesman forced himself to sit straight behind his floating table. He drew a deep breath, and looked Smith in the eye.

"Inform the Governing Council, and the House of Mogg, that we will recommend to the Central Executive that, in due time, Earth be admitted to the Great Galactic Community as a Full Member. Please express our regrets that we cannot stay longer on this occasion; but urgent matters have been reported to us, and we must leave at once."

Smith repeated the whole thing in the Council Chamber, answered questions of the Governing Council of Earth, and of high representatives of the House of Mogg, and finally found himself drained dry of information. By this time, he felt thoroughly worn out, fed up, and exasperated.

The chairman of the Council looked around, and said thoughtfully, "I believe that answers *our* questions."

The Leading Crown Prince of the House of Mogg thought a moment, and nodded. "It covers what we wanted to know."

Smith said, in as polite a voice as he could manage, "Sir, could you tell me whether I will *ever* find out what actuallly happened?"

"Why," said the chairman of the Governing Council, "haven't you worked that out by now?"

"No one has bothered to tell me about it, sir."

"You were *there*, weren't you?"

"I was a kind of ignorant bystander, I suppose. I spent a good part of my time wondering why someone qualified hadn't been sent."

"You *were* qualified, or we wouldn't have sent you."

"Sir, I didn't know the first thing about the situation!"

"*That* was one of your chief qualifications."

Smith blinked. Why would they send someone who knew nothing? Abruptly he thought again of the Galactic Emissary's odd habit of sitting with his head to one side, occasionally moving his lips very slightly, as if he were talking to someone out of sight.

The chairman said, "Those people ran rings around the Earth representatives the first time they were here. The amazing part of it was, the better informed *our* representative was, the better the Galactics looked. On thinking it all over afterward, it dawned on us that, impossible as it seemed, this would make sense *if they were telepathic*, or if they had a device that served the same purpose.

"Moreover," said the chairman, "while we couldn't be sure what their setup was, they insisted that custom and ceremonial required them to do important business at a particular floating desk on their ship, so it seemed *likely* that the

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telepathy was carried out by the aid of a good deal of equipment that they preferred not to move, and that was located somewhere near that desk.

"Now then, what were we to do? Apparently, the more capable *our* representative, the more the Galactics would learn. How could we deal with them, granted they had this advantage? The only way we could see was to send someone who was levelheaded and self-controlled, but *who knew practically nothing whatever about what was taking place.*" He smiled at Smith's expression. "Of course, you were, in effect, a puppet. But that was what we *had* to have to deal with them on an equal basis. We weren't quite sure of their purpose, and it would have been unwise to reveal our hand."

"But, sir," said Smith, "why did nearly every piece of information *jolt* them? What should such advanced races care about our shorthand, our identification stamps, and the House of Mogg's refusal to accept their gifts? Granted, the Galactics might choose not to accept us into their organization. But . . . I got the impression some sort of *fight* was going on, and, without knowing what I was doing I was somehow delivering heavy blows."

"You were."

"But how?"

The chairman leaned forward.

"These benevolent Galactics, with their marvelous gifts, weren't here to uplift us, and welcome us lovingly into their Great Galactic Community. They were here, plainly and simply, *to conquer us.*"

Smith felt as if the ground had shifted under his feet.

"But, sir—to conquer people, do you give them gifts that actually make them better off? That increase their ability and strength?"

"Yes," said the chairman dryly, "if you're slick enough. If you can read minds and see which poison your opponent thinks would be beneficial to him. If you're technologically advanced, and have had enough practice, so that it's simply a matter of varying your standard procedure to fit the victim."

The chairman turned, and nodded to a Burdeenite wearing sword, pistol, and some kind of translucent chain mail. The Burdeenite crossed the room, and took away a screen before a table set against the wall. This revealed a large crystal lying on the table, a cage of mice beside the crystal, and, in a tub beside the table, a *marbus* plant, with its spray of slender green leaves, out of the center of which grew a tall leafy stalk covered with buds and small pink flowers. The Burdeenite returned to his seat.

The chairman looked at Smith. "Thanks to the so-called 'condensed-circuit computer,' of which such crystals as that on the table are the heart, we now have a remarkably complex civilization

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based on extremely precise timing. Our air travel, for instance, is as complicated as a series of split-second ballet maneuvers, changing and interlocking without letup. Chaos would follow the slightest misjudgment. Everything rests on the computers that control the system."

The Burdeenite coolly raised a thing like a small radar antenna, and briefly aimed it at the crystal.

There was a singing note, followed by a sound like a tossed handful of sand.

In the crystal's place was a pile of tiny grains.

The chairman said, "Without the crystal, the condensed-circuit computer is useless, and without the condensed-circuit computer, our Galactic-based technology would collapse. But that is only part of the story. Near the remains of the crystal, you see a cage. You'll notice that it's divided in half by a vertical partition. On the left side, we have mice treated with the Galactics' ultimate birth-control Superpill. On the right side, we have mice that are not treated."

As the chairman stopped speaking, the Burdeenite leaned forward and tossed a small capsule that smashed on the floor halfway across the room.

The mice in the right half of the cage continued to hop leisurely from food dish to water dish, to and from a box in the corner where they popped out of sight.

The mice in the left side of the cage began frenziedly to mate.

The chairman said, "Observe that, provided the active agent of the so-called Superpill is already in the system, this effect is created by a minute concentration of another substance *in the air*. The larger the mass of the animal, for a given concentration, the less dramatic the immediate effect. But the ultimate result is the same—*a drastic increase of the birth rate to far above normal.*"

As the chairman stopped talking, the Burdeenite calmly raised a small jeweled atomizer, aimed it across the room, and squeezed the bulb.

Smith, momentarily dazed, stared at the shattered crystal and the two halves of the mouse cage. In each case, the change had been made so *easily*. Then he turned, to glance at the atomizer.

From behind him came a sound like a loose coil of rope tossed on the floor.

Smith whirled.

The tall stalk of the marbus plant lay outstretched, so flat it almost looked as if it had been painted on the floor. Around the ring of the tub, the slender leaves hung straight and limp.

"Just suppose," said the chairman, "that you were in charge of a great spaceship—perhaps belonging to a great Galactic organization (never mind about it being a *benevolent* organization) and let's just sup-

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pose your job was to subvert Earth and make it obedient to that great Galactic organization—what could be nicer than to get Earth *totally dependent* on certain technological developments *that you could withdraw at will?* At a mere snap of your fingers, Earth's whole technological civilization could collapse, to leave, for practical purposes, a planetful of ignorant savages with no relevant skills, whose reproduction rate could be altered at will, and, if you so chose, whose main food supply could also be wiped out with a snap of your fingers. Think how cooperative such people would be once they saw what you could do. Suppose that, having delivered the necessaries to bring about this situation and having seen the fools rushing to their own destruction, you then went away to take care of other business and returned when your calculations showed the situation would be ripe.

"Then," said the chairman, "suppose you summoned to your ship the Earth representative, planning perhaps to give him the same little demonstration we have just given here, and suppose you discovered: first, that a mere *second lieutenant* had been sent to deal with you; next, that in your absence, instead of dependence on computerized voice typers, a new, *completely nontechnological* system of rapid writing had been developed; third, that a *completely nontechnological uncomputerized* system of identification had come into use; fourth, that one-quarter of the Earth's land surface was in the hands of a sect which, *for religious motives,* rejected the gifts, and in their place was developing Earth's own technology at a fever pitch; fifth, that this sect was armed to the teeth, dug in, stocked for a long fight, seasoned in battle, and so situated that you couldn't count on striking at the nonmembers without hitting the members of the sect, or vice versa; and, sixth, to top it all off, suppose you had no way to judge whether this was *all* the bad news, or whether this was just the tip of the iceberg showing above the water, with a lot more underneath? *If you had been in that situation, would it have jarred you?"*

Smith gave a low, involuntary whistle.

The chairman smiled.

"Any further questions?"

"Just one, sir, if I won't be taking too much time."

"Go ahead. Ask what you want."

"Well—*are* the Galactics beat? Considering, that is, their technology, and the fact that part of Earth, and a large part, *is* dependent on their gifts?"

"It depends on what you mean by 'beat.' If they wanted to destroy the whole planet, who knows? But short of that, they're confronted by a situation that offers, so far as we can see, no sure solution for them at all. Different races, and different animals, have different systems of

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conquest. Tigers spring on their victims from concealment, spiders ensnare them, foxes trick them, wolves run them down. Each selects the particular game suitable for its purposes. The Galactics' system apparently is to find races in a certain stage of technological development, conceivably by detecting incidental electrical signs, and then offer them a free ride on a technological flying carpet. Once the victim steps on the flying carpet, they jerk the rug out from under his feet. Who knows what equipment it takes to find the victims and tailor this technique to suit them? Maybe that ship of theirs is equipped with things we've never conceived of—*and has very little actual armament.* But even if it's heavily armed, and they *could* kill a lot of humans, how does that help *them?*

"If an elephant turns up at a water hole, a big cat *can* attack the elephant; it will hurt the elephant, all right, but what does the cat get out of it? Just some unwanted excitement, some sore muscles, and the possibility of getting flattened into a rug. There are not many calories in war for its own sake. When an oversize bumblebee gets in the web of an efficient spider, the spider cuts it loose. Better to get the thing out of there so something can get in. No fox in its right mind is going to sink its teeth into a bear. A sensible predator attacks creatures it can hope to digest, without the risk of being finished off in the attempt.

"Now that we're on guard, if the Galactics want to conquer us, I think they can only hope to do it after a long struggle, requiring endurance, discipline, and courage—and not just the advantage of their technology. And yet, a technology like theirs will tend to relieve them of much of the need to *use* those other traits. And, for lack of some means of exercising them, traits tend to disappear."

The chairman shook his head. "No, I imagine the Galactics—or that bunch of them, anyway—have found their specialized confidence technique too profitable to get themselves entangled in a profitless unpredictable situation calling for traits they aren't particularly strong in anyway."

Smith thought back to the Galactics' reactions. There had been *some* trace of endurance, discipline, and courage in evidence—but not much.

He glanced across at the Burdeenites, and was struck by the evident cross-grained tenacious independent quality of those who would pit seemingly antique methods against the newest of the modern, *and win.*

Looking at those faces, Smith could suddenly see things from the predator's viewpoint:

When the victim manifests *those* qualities—better hunt up another victim. ■

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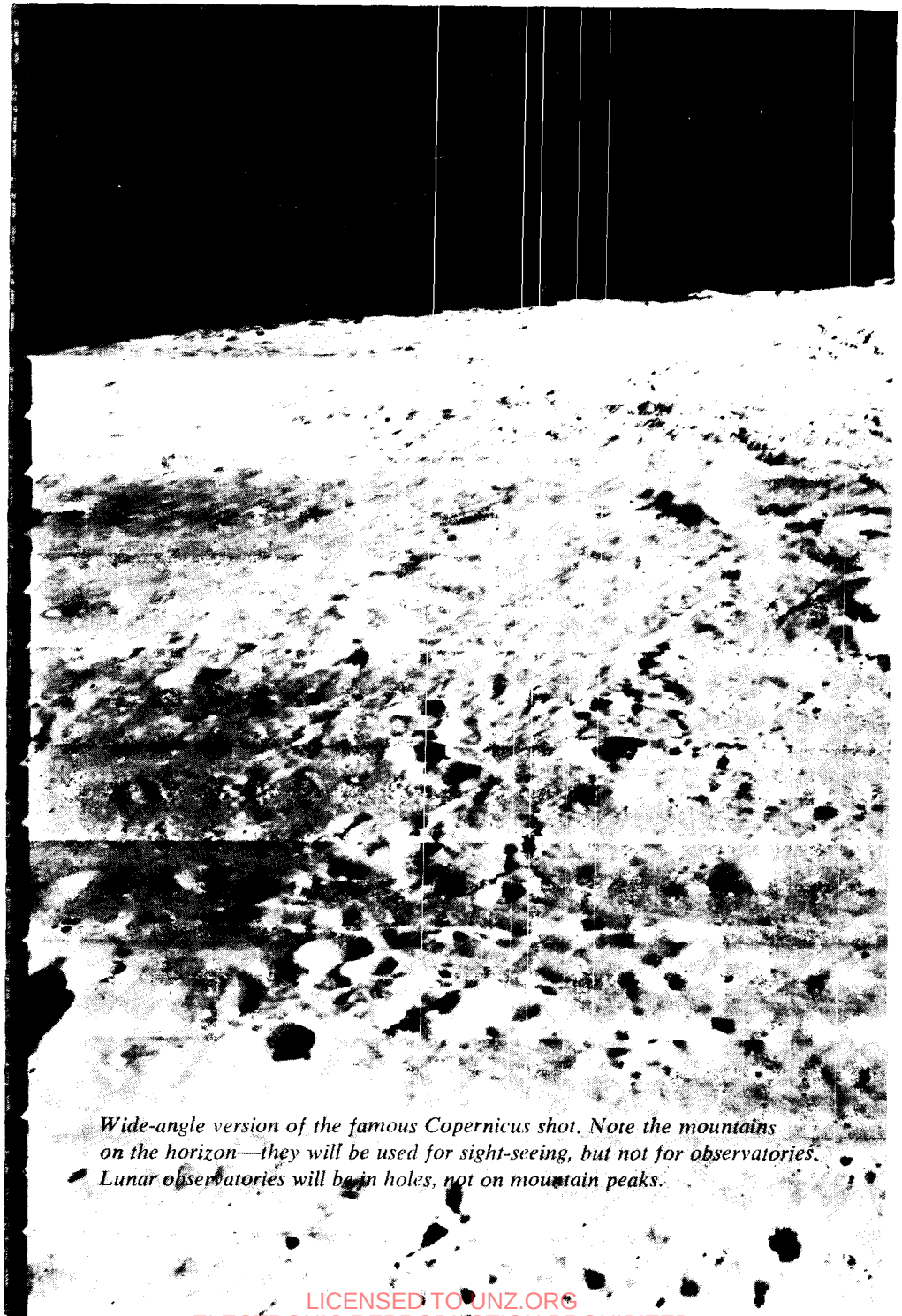

Wide-angle version of the famous Copernicus shot. Note the mountains on the horizon—they will be used for sight-seeing, but not for observatories. Lunar observatories will be in holes, not on mountain peaks.

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TAKING THE LID OFF

WILLIAM T. POWERS

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Powers is one of those men actively engaged in the research to take the lid—the atmospheric lid—off of astronomy. The advantages and the problems of supra-atmospheric astrophotography are, unfortunately, almost equally immense!

On a good-to-average night, a well-figured 40-inch telescope can resolve objects as small as one mile in diameter on the surface of the moon. The trouble is, so can a nicely-made 4-inch telescope bought from a mail-order house for eighty dollars. Of course, the 40-inch picture is brighter, and the sidereal drive is probably better, and there's a dome to keep the wind from shaking the image—but on many a night the amateur crouched in his backyard is seeing just as much of the moon as the astronomer he envies so much. On some nights he actually sees more. How come? It's this quivering cover of amber Jell-O under which all earthly telescopes, big and small, are buried.

"Seeing" is the term given by astronomers to the net effect of smog, hot-air bubbles, cold-air cells, translucent clouds, and water vapor on their results. I can't imagine how that term was ever selected, since the principal consequence of seeing effects is *not* seeing. Strictly speaking, the term "seeing" refers primarily to geometric effects of the atmosphere on incoming wavefronts of light. Light which has made its way clear across our galaxy, staying in nice concentric circles for a hundred thousand years, gets within 0.0001 second of its destination, a telescope, and suddenly strikes out in a dozen random directions. By the time the wavefront reaches the glass, it is no longer a single wavefront, but is a conglomeration of wavefronts each apparently coming from a different source. All the sources are fairly near in the sky, being distributed around over a second of arc or so, but they are not near enough to enable the 40-inch aperture to submit anything better than a blurry patch to the astronomer's inspection.

In principle a good 40-inch telescope will resolve one-tenth of a second of arc—that means it could

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tell the difference between a penny and two cents at a distance of twenty-five miles, through the ideal medium, meaning none. In fact a good 40-inch telescope *does* resolve 0.1 second of arc—it's just that the atmosphere splits a star-image up into a thousand little images; the result is faithfully reproduced by the telescope. This is like making a tape of a dictaphone recording to play on your hi-fi.

To the human eye the atmosphere appears perfectly transparent, according to some rather old books. (I should explain to younger readers that from certain mountaintops it is still possible to see all the way to the horizon.) This illusion is caused by the fact that creatures which had vision in the ultraviolet or far infrared groped around until they were all eaten up by those whose visual sensitivity matched the transmission of the air. As a matter of fact most of the light that reaches the atmosphere is soaked up long before the last 0.0001 second of the journey is over. We know the missing wavelengths must have been there, because no physically conceivable star could actually have the kind of spectrum that we record, and anyway when laboratory spectra of hot or ionized substances are made in *vacuum* spectrographs, information springs into existence at both the high and the low wavelength ends.

Our theories which predict emissions from objects as hot as stars ranging from far infrared, through the visual, through the ultraviolet and on into X rays, gamma rays, and cosmic rays, are quite well substantiated by laboratory experiments. To an astronomer, however, those theoretical and laboratory emissions or absorptions are cruel mockeries that taunt him while he sits by his telescope hour after hour, waiting to collect a plateful of the thin dribble that is left after the atmosphere gets through with his starlight. Nobody could blame an astronomer for entertaining wild dreams of moving his whole observatory about one hundred fifty miles straight up—or for actually doing it.

For some years, now, as a matter of fact, astronomers have been doing just that, if only in a rather temporary way. The Aerobee rocket, designed originally for meteorology, is used in great quantities to hurl sensors up out of the atmosphere for observing periods as long as five minutes; some of them are even stabilized, so the pointing direction doesn't careen about the sky too badly. It's really astonishing how much information can be obtained from the records of those flights. Imagine looking at a record of light-intensity that goes up, up a little more, down, squiggle, up, way down . . . and so forth for several yards, and eventually being able to point to various bumps, saying confidently, "That's Canopus, and there's the Milky Way, and this is

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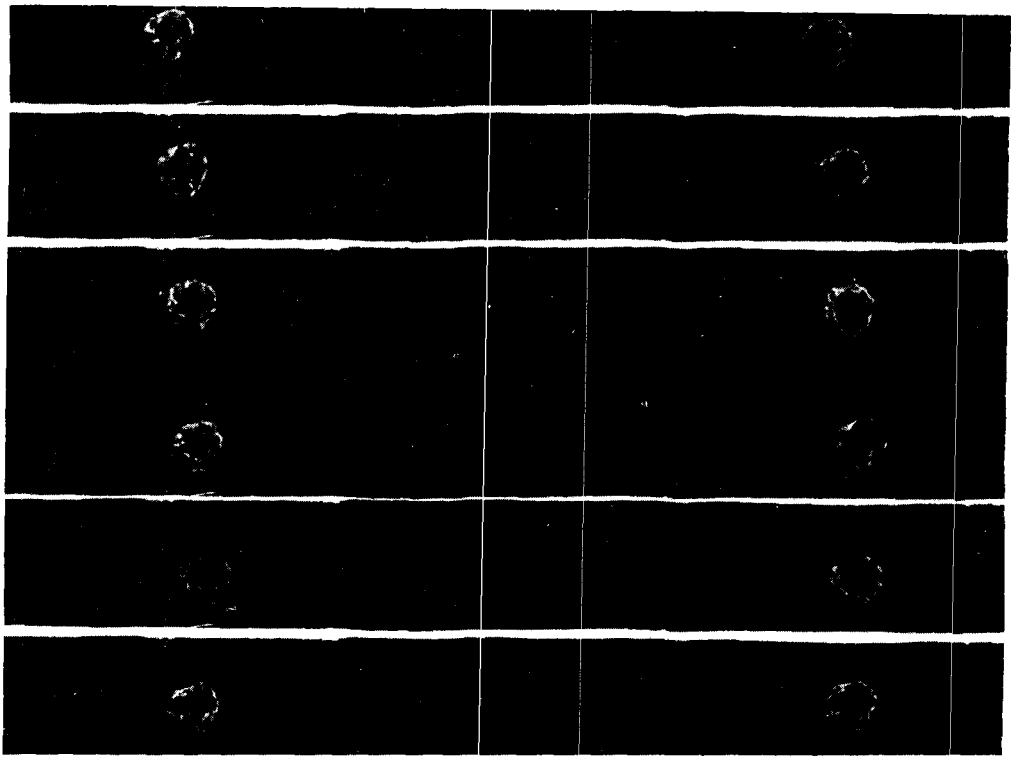

The Problem: These are short-exposure pictures of a 12-inch telescope mirror illuminated by light from a bright star—a picture of the atmospheric turbulence in the 12-inch column of air that is in the way.

that funny thing in Scorpio." Astronomers, by the way, really do say "Milky Way," even to each other.

Five-minute bursts of frantic observing activity, however, are not the astronomer's idea of an ideal program. What they want is an honest-to-Herschel telescope, available for anything they think up to do. They want to put a plate in the plateholder, swing the tube around to the guide star, engage the drive, and hunch happily over the guide eyepiece fiddling with the slow-motion controls, all in a hard vacuum. There is a certain incompatibility, however, between telescopes in space and astronomers in space; as opposed to telescopes, astronomers work better in an atmosphere. The modern age dictates against old-time astronomy, at least for those who want to do their observing in space. All of the traditional techniques of astronomy have to be re-thought, as we plan ahead for the first manned observatories off the earth.

For purely economic reasons if none other, the first vacuum observatories have been, and will con-

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tinue to be, automatic stations in earth orbit. These are not really observatories, however, since they are designed only to perform a few functions that are predetermined years before the flights ever take place: they are classed as *experiments*. The true general-purpose observatories, complete with several changes of astronomers, will come later, but the problems are already well-known and people are working on solving them. Let's look, then, at some of the special problems of a manned orbiting observatory (MOO!), and how one gets around them.

As everyone knows, an object in orbit is in free-fall, a condition of no effective gravitational force. Wrong. An object in orbit consists of a collection of particles—glued together or not—each of which would, indeed, be in a stress-free condition of free flight if only it weren't attached to its neighbors. In particular, every particle is bothered by the presence of other particles which are either closer to the main center of attraction or farther from it. The ones closer to the center experience too much force for the orbit they are in, while the ones farther out experience too little. If the object is a perfectly symmetrical sphere with its center of gravity at its geometrical center, then all these urges cancel out, leaving the behavior of the whole just like that of a single particle. The only parts of the object, however, for which centrifugal force due to the orbital speed just cancels the gravitational attraction—the condition for an orbit—are the one particle at the center of gravity, assuming there is something there, and the other particles lying fore and aft of that point along the orbital path.

Suppose now that instead of building a spherical telescope, we make one that is more or less cylindrical. Suppose that we want to point this telescope at some star, and that the direction to the star happens to be, for the moment, exactly away from the center of the earth, at right angles to the direction of our circular orbit. The mirror end, being closer to the earth, is attracted too much, and the other end too little, for the orbit; everything cancels, however, and we are in fine shape. As time goes on the telescope proceeds around the orbit, and before long the line of sight, still aimed at the star, is inclined forty-five degrees to the direction of the orbit, and to the line to the earth's center. The mirror end is still experiencing too much gravitational force and the other end too little, so the mirror end will start to swing toward a line to the earth's center. When this motion finally brings the telescope's axis onto the radius-line, the telescope will be moving fastest, and will naturally keep on swinging; the torque from the gravity gradient will reverse, and the swing will slow down and stop, reverse, and so on

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forever. We have a gravity pendulum hanging in space, set up by the fact that gravitational force falls off with distance and by our choice of an asymmetrical telescope. So what has happened to our wonderful idea of a gravity-free telescope hanging motionless in space?

Actually, nothing we can't cope with for ten or twenty million dollars. The difference in acceleration due to gravity between the two ends of a 20-foot telescope in close earth orbit is at most about four microgees. Under conditions of zero friction, of course, this much difference will make the telescope swing, but to counter the swing doesn't take much energy. If we didn't counter it, though, then our 20-foot telescope could, at the point of maximum disturbance, be subject to an angular acceleration of .00001 radian (one radian = 57 degrees) per second, every second. Not much? Well, ten microradians is about two seconds of arc, or some twenty times the resolution of a 40-inch telescope! How is anyone going to take a high-resolution photograph of a planet with the telescope jiggling around like that?

We conclude that it will be necessary to stabilize the telescope. How, then, to anchor something that is shooting through space at five miles per second, a couple of hundred miles from the nearest ground?

The first problem is to find a way to decide when the telescope *is* stable, and to get a measure of the correction that is needed before the motion of the telescope gets big enough to ruin the photograph. Since the only reference system available is the star background itself, we will obviously have to use some kind of trackers, photoelectric gadgets that can detect how far a star-image is from the center of the field. Naturally, this leads to more problems.

What we need, or would like, is a way to keep the telescope from wandering more than a fraction of its "resolution element"—the size, in the focal plane, of the image it makes of a perfect point source. In a perfect 40-inch telescope this image would be about 0.1 second of arc in diameter, about 1/400 of the apparent diameter of Jupiter. That, of course, is near the center of the field; near the edges the image deteriorates. Do I see any hands raised? Right. How big, someone is asking, does the *star tracker* have to be, to see a motion that is small compared to 0.1 second of arc? 400 inches?

That would be silly, of course: you don't send up a 400-inch telescope to serve as a tracker for a 40-inch telescope, even if you need it. Of course you *don't* need it, but the reason you don't involves doing away with an old superstition, the idea that the resolving power of a telescope is limited by its aperture.

Suppose we take the image of a star at the focal plane of a 40-inch

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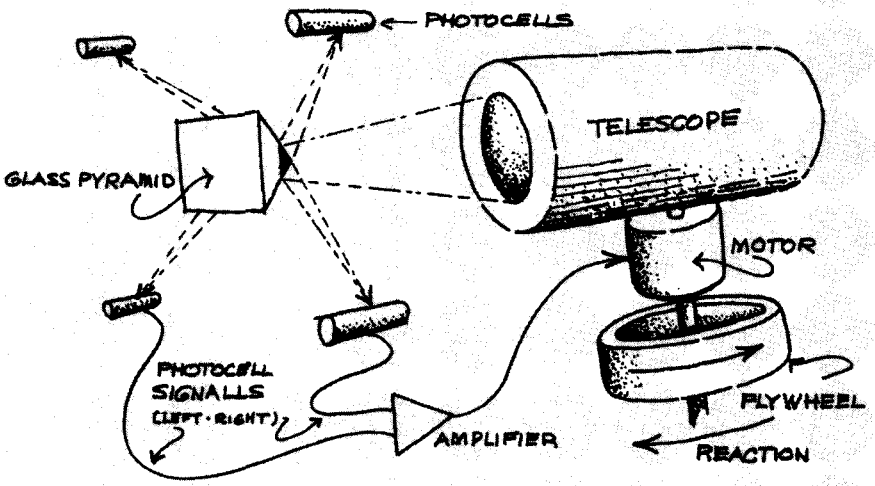
telescope having a focal length of 600 inches. The diameter of the image of a point source like a very distant star will be about 0.0006 inches in diameter. This image can be projected with a magnification of, say one hundred times, to form an image 0.06 inches in diameter. Let this magnified image fall on the sharp tip of a four-sided aluminized glass pyramid, so the light is split into four beams radiating out at right angles to the original direction, and in front of each beam put a sensitive photocell. Two of the photocells will sense the beams going "left" and "right," and the other two will sense the beams going "up" and "down." Consider the left-right pair.

When the star-image is perfectly centered in the left-right direction, the left and right photocells will detect equal light, and will put out equal signals. One signal can be electronically subtracted from the other, to yield zero putput. If we connect this zero signal to an amplifier, and the amplifier to a DC motor, the motor will spin along at zero speed. Let's put a flywheel on the motor while we're looking at it; that takes care of the rest of the stabilization system. (How? Heh, heh, heh. Wait.)

Let us now allow a micrometeorite to strike the telescope, making it start to move left. It moves 0.001 second of arc, or 1/100 of a resolution element. The image on the tip



STAR-TRACKING SYSTEM

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of the pyramid moves 1/100 of its diameter, the left photocell sees 1% more light and the right photocell sees 1% less light. The electronic subtractor now comes out with a remainder of 2% of the total signal from each photocell. Two percent is bigger than 0%; the amplifier makes it a *lot* bigger than 0%, and the DC motor begins to spin. But back up a millisec.

When the motor started to spin, it had to accelerate from zero angular velocity to some angular velocity. This was accomplished by a magnetic field in the stator which accelerated the armature and flywheel—but it also applied torque the other way, to the motor mount. The mount is attached to the telescope, and the axis is arranged so that the reaction torques act in the left-right direction. As the star image drifts slowly to the left, the motor exerts more and more reaction torque, until finally the star image stops. (If it goes faster and faster turn everything off and reverse the motor leads.) At this point the motor torque is still nonzero, so the star-image moves back toward balance; as it does so, the motor torque drops toward zero. When—if—equilibrium is established, the motor is no longer exerting any reaction torque on the telescope, and the star is centered again. Notice, however, that the motor armature is still spinning away! The torque rose and fell, but it never *reversed*, so all the while that the star image was being brought back to center the motor was speeding up. Let's leave it spinning for the time being and go back to the photocells.

You will have noticed, I am sure, that somehow we have managed to keep the star image from moving more than 1/100 of the distance that the telescope can resolve. We have resolved, in other words, a motion that is only 1% of the resolving power set by the size of the telescope and the wavelength of light. Therein lies another story, all about trading time for resolution and other exotic topics, but for now the point of interest is that we *can* use a 40-inch telescope to serve as its own star tracker—or even a 4-inch telescope, if we can find a bright enough star to track on. I refer the reader to a previous article —"The Misers"—for an explanation, and remark only that the star being tracked on must be bright enough to yield an accurate error-signal within a few tenths of a second of a disturbance.

We have beaten the resolving-power problem, but that grinding noise is the bearings wearing out in the motor we left spinning. Since there is friction, the armature is trying to make the rest of the motor catch up with it, and so is exerting just the opposite torque to the torque that made it speed up in the first place. If we want the telescope to stay put, we have to trickle

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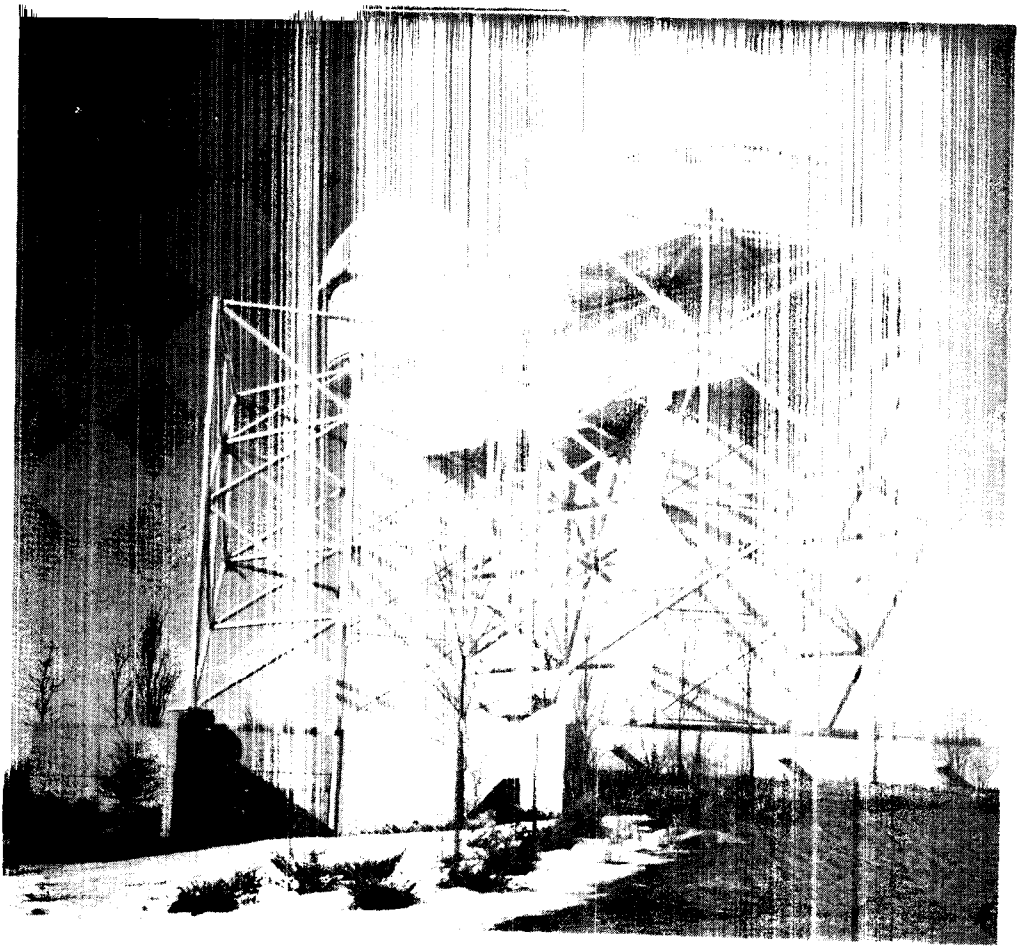

It helps to get above the temperature and turbulence effects near the ground. I work in this thing called the Lindheimer Astronomical Research Center (at Northwestern University). The road that gets you here is called Sidereal Drive.

enough power into the motor to make up for the frictional drag in its bearings, and if we looked closely enough at the star tracker, we would see that is exactly the situation. The star did not get away from center to center, and there is just enough imbalance to keep the motor running at constant speed.

When that micrometeoroid hit the telescope off-center, it imparted a quantity known as *angular momentum* to the telescope. Our star tracker has transferred that angular momentum right out of the telescope again, into the spinning motor and its flywheel. The angular momentum brought by the micro-

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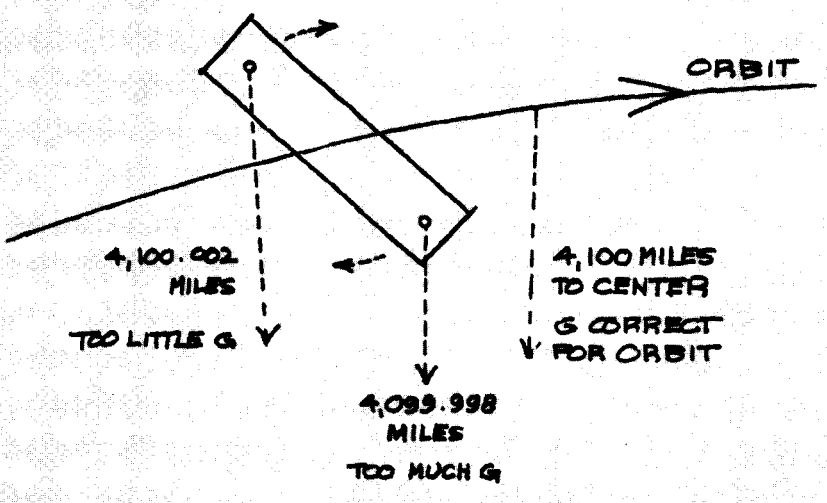
meteoroid hasn't gone away; we've simply moved it to a more convenient location. It has been swept under the rug, but the more off-center hits that accumulate in the same direction, the bigger the bulge under the rug will get, until eventually something will simply *have* to be done about it. The motor can turn only so fast without shaking up the telescope or bursting, and anyway the faster it goes, storing up more and more angular momentum, the more power is needed to keep it going at constant speed against friction. We will have to dump that angular momentum somewhere, so we can start over. Don't waste time going through *my* first solution—a brilliant stroke of genius a long time ago in a mechanics class—of simply turning the spinning motor end-for-end. It isn't "simple" to turn a spining motor end-for-end; you get exactly the same result in angular momentum if you decelerate it to a stop and accelerate it the other way. Unfortunately.

Micrometeoroids don't contribute much angular momentum, nor would it all be in the same direction; however there are sources of angular momentum that accumulate, so eventually the dumping is necessary. And to dump angular momentum it is necessary to couple yourself to something else.

One way to do it is to carry compressed gas aboard, and from time to time emit an off-center jet of it.



GRAVITY-GRADIENT PENDULUM

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The gas molecules then act like micrometeoroids that carry off angular momentum in exactly the way it was described as arriving, above. This will work as long as there is any gas left; when it is gone, you had better start making plans about abandoning ship.

Another way to do it is to couple to the earth. At five miles per second that may seem like quite a trick, but the secret lies in one of the same phenomena that cause trouble, the gravity gradient. Suppose we hang a weight on a long boom, sticking out toward the earth below. The boom will oscillate like a pendulum, because of the difference in gravitational pull between the attachment to the station we are on and the weighted end. So far no help. At the attachment-point, however, we place another weighted object, and we introduce friction into the swivel connecting it to the boom. Now the weighted object will tend to follow the swings of the boom, but not fully; the frictional swivel will grate and rub and grow slightly warm, and finally the pendulum will stop swinging, all its kinetic energy having been dissipated as heat. Now the pendulum always points straight toward the center of the earth, making one 360-degree swing relative to the stars on every orbit. If we don't hang on to the pendulum too tightly, or the weighted object being used to help generate frictional losses, the ungainly assembly can become a hole down which we can toss angular momentum. The angular momentum gets transferred to the earth, which doesn't notice it. We can't dump very much at a time, but we don't need to under ordinary circumstances. To dump, all we have to do is apply a torque to the pendulum briefly, making it swing in the same direction that the motor is spinning, and then let go; that will produce a star-tracker error that will make the motor accelerate the other way—decelerate—and after enough dumps the motor will be standing still, or will be spinning the other way. One has to wait between dumps, of course, for the pendulum to stop swinging.

If the idea of the pendulum seems too clumsy, there is another way. The earth does have a magnetic field, and by clever manipulation of magnets aboard ship one can transfer torque, hence angular momentum, to the earth that way. Also it is well known that the solar wind and solar photon radiation exert pressure—one can hoist sails now and then to collect angular momentum or get rid of it. It's all very delicate, but possible. One uses his antientropic brain to put order into all the disorderly forces that are producing problems in the first place.

After coming up for air from the problem of stabilization, we become aware of the fact that while we have left a nicely stabilized telescope in orbit up there, we have no

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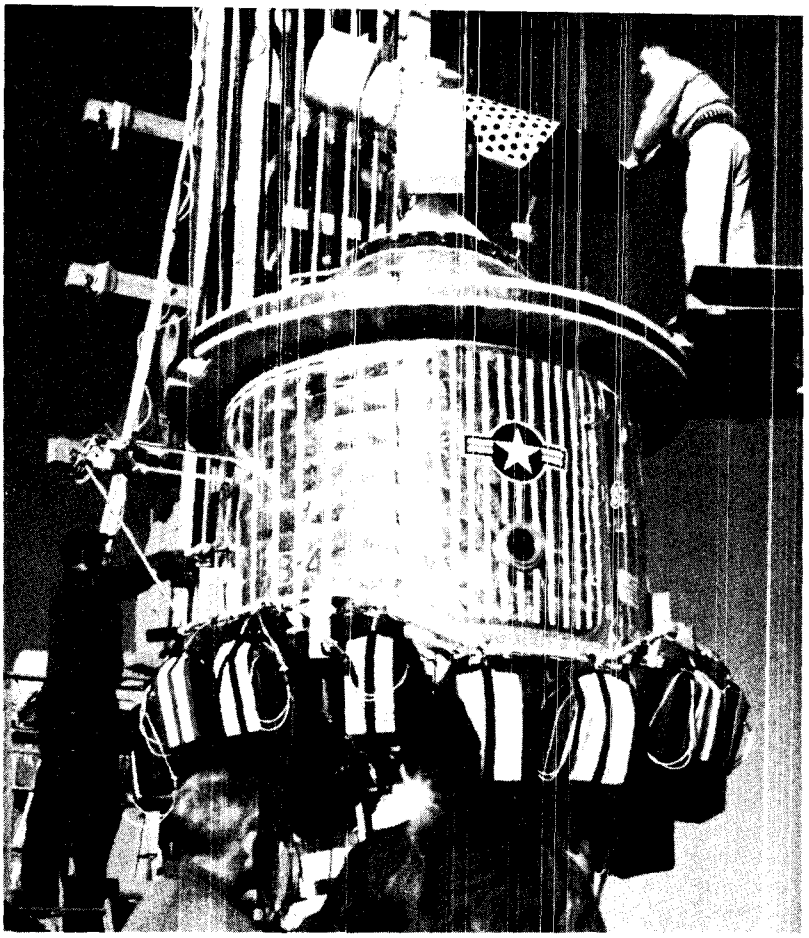

observatory yet. Observatories need equipment, and equipment needs astronomers, and astronomers need something to breathe. Something is needed to keep reflecting the air molecules back into the vicinity of the astronomer, which suggests an enclosure of some sort, called a space station.

The earliest space stations to be used for the orbiting manned observatory (OMO?) will consist of the empty hydrogen tanks from the Saturn second stage; astronaut-scientists will rendezvous with the empty stage using an Apollo command module and a second Saturn, open the tank and vacuum out the remaining hydrogen—a real prob-

Even better would be to mount a telescope on a high-altitude balloon. This experiment (Project Stargazer, in 1962) was a test-bed for the idea of operating balloon-borne manned *observatories at 80,000 feet.*

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lem is you plan on adding oxygen later—unfold the bulkheads stowed against the walls of the tank, and install a few instruments, including a nice 6-inch Schmidt ultraviolet camera, three of which are all ready and waiting in the basement of the Dearborn Observatory.

Later on space observatories will be equipped with larger telescopes, so we may now imagine our telescope, stabilized in space, with a cylindrical tank of astronomers attached to it, the astronomers breathing gently in and out, and the star-tracker flywheels accelerating and decelerating with every breath. To breathe in, the astronomer must raise his center of gravity—away from his feet—say, 0.1 inches. If he weighs 1/1000 as much as the station-telescope assembly and is hanging on near one end of it, and I make up some reasonable moment-of-inertia figures without bothering to mention them, we may calculate that the magnified image of the star at the tracker would move close to 0.1 inches if no correction were made. Either we have to provide some very energetic star trackers, or give up the idea of letting the astronomers *turn around*, or scratch, or move instruments from one place to another. Even the equipment must be carefully screened. No tape recorders (think of the fast rewind); no air-circulating fans unless they are speed-regulated. And definitely, no turning around.

We are forced to disengage the telescope from the station. Now we have a happier picture; the astronomers turning this way and that, breathing, winding their wristwatches, playing tapes from home to pass the time until they are picked up. For of course they can't reach their telescope, and have nothing to do. This is how designers think, or at least some designers, who think like me. One visualizes what he already has as clearly as possible, and tries to see what is wrong, and then fixes it, which is much, much easier to do *before* anything is launched.

If we are very careful, we may re-attach the telescope to the station, provided that we do it in the right way. The right way is to employ the space station as one gigantic flywheel for absorbing the angular momentum from the telescope; in other words, we mount the telescope on the space station in gimbals, and connect the star-tracker motors to the appropriate shafts. If something tries to make the telescope turn, the trackers try to turn the space station the same way, and the telescope stays put. If someone moves about in the station, the star trackers simply overcome the friction in the gimbal bearings and let the space station rock about any way it wants to, within the limits of motion of the gimbals. There are several approaches to this gimballing—some people actually want the telescope to float free near . . . well, fairly near . . . well, in the same

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orbit as the station. A difference of one foot in orbital radius, for low orbits, makes a difference of two feet per hour in orbital speed. I suppose one could keep reeling the telescope back in.

At least we have the telescope and station in one compatible package. What remains now is to arrange for attaching instruments at the focal plane of the telescope, making exposures, getting the film back, changing instruments, and so on. I am informed that in order to put on a spacesuit and go outside requires three hours; to get back in and take off the spacesuit requires about an hour—if one is fussy about getting back inside alive.

Clearly, going outside and fiddling around with the telescope is not going to be a regular part of the observing program. If photographs have to be taken, the film will be moved out of a storage cassette, exposed by remotely controlling a shutter, and then moved into another cassette for safekeeping. If one wants a photoelectric photometer instead of a camera, he will remove the camera and move the photometer into place by remote control. He will watch the guidestars through a television relay, and the television camera will itself be one of the prime observational tools, since it will enable the astronomer to see into the IR and UV and to see fainter objects before photographing them than he could see by eyeballing the image. The only reason for going outside will be to load new film cassettes in place, and if the designers are very clever, even that won't be necessary. The telescope can be mounted so that the business end—the back—can be swung around right against the wall of the station so that an air lock can be extruded to swallow up the film packs or whatever else needs changing. Then the only reason for going outside will be to get into the observatory or to leave for home.

Getting a manned observatory into orbit around the earth will certainly take the lid off for astronomy. With free access to all wavelenghts that sensors can sense and reflective coatings can reflect, astronomers can begin to think in terms of really complete pictures of stellar atmospheres, emission and absorption nebulae, galactic radiations, and so on; the darkness of the sky and the freedom from seeing effects will permit long exposures without loss of contrast due to skylight, and will make photometry at least ten times as precise as is now possible.

I predict that the enthusiasm will persist for at least three years, during which time the astronomers will gradually begin to notice that 40 inches really isn't enough, that the sky isn't all that dark, that the earth

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I think Bill White and Joe Kittenger were aboard this one. The project eventually died from financial malnutrition.

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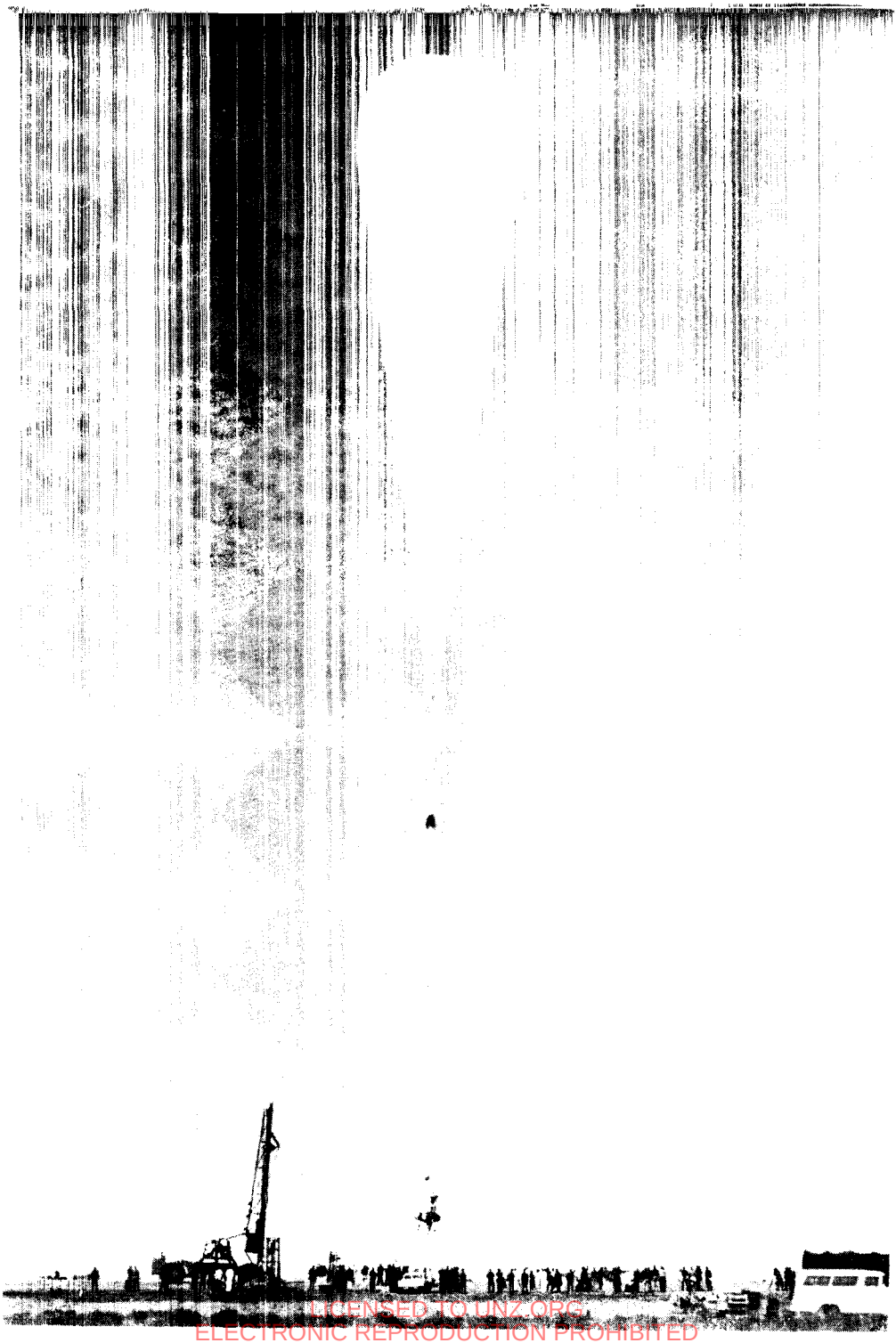

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still blots out half of the sky, and that the best observing is still at night when earthlight and sunlight are not worming their way into the telescope or illuminating the atmosphere that inevitably will float near the station. Also, they will, sooner or later, want to take a five-hour exposure on something that is eclipsed by the earth for fifty minutes out of every one hundred-minute orbit, and sooner or later they will want to take advantage of computer-controlled methods of data acquisition —and discover that they just can't carry enough memory aboard the ship.

The present Orbiting Astronomical Observatory—not yet successfully launched, but another try is coming soon—is going to face these problems. The capacity to store information is important, because in a low orbit, the satellite is within reach of receiving stations only for seven minutes or so each time around. It will not be possible to take much advantage of television techniques simply because a television system can generate so much information that only an insignificant fraction of it can be stored in the one hundred or two hundred thousand bit memories to be used—or even, for that matter, in million-bit memories: a good television camera on a 40-inch telescope could produce, every ten seconds, at least ten million bits of information. Furthermore at least three complete receiving stations are required because the orbit may swing thousands of miles north or south of the equator.

One answer to many of these problems is to move the orbit farther out, so the earth will block less of the sky and contribute less light, and so that the information links to the ground will require only one station; the obvious place to go is into a synchronous orbit, 22,000 miles "up". The link with the ground could then be continuous. The only problem is that the synchronous orbit is right in the outer Van Allen belt, and is largely outside the protective shield of the earth's field; that may be too unhealthful a place for men to live. At present, of course, launching a space station that far out and keeping it supplied would be very expensive, but that will not be an important factor in the long run. When the Gross National Product reaches a trillion dollars, in ten or fifteen years, ten billion dollars a year for space will be quite easy to justify. One percent of our wealth, spent at home, for a good bit more than one percent of the adventure in life.

When one has gone 22,000 miles, he is only about another mile and a half per second from the moon's surface, in terms of the velocity-change needed to land there. That is not an inconsiderable amount when many tons of supplies may have to be transported, but again we must not let our thinking become cramped. There will come a day

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when the moon will be considered as a location for observatories strictly on the basis of its virtues as a location, with cost a very secondary factor. The virtues are considerable.

One of the more appealing facts about the moon is that it can absorb essentially an unlimited amount of angular momentum. One can observe from one part of it and run bulldozers on other parts of it at the same time. Instead of elaborate star trackers, one needs only one simple motor and a gear train to keep the telescope pointing precisely at one star for long periods of time. The moon's motion is mainly a simple rotation about its polar axis at about 1/28 of the earth's rate, or ½ second of arc per second. Because of the moon's asymmetry and its location in the earth's gravity gradient, it is a gravity-gradient pendulum and so there are "libration" effects; small deviations from perfectly uniform axial rotation. These deviations are sometimes looked on as an argument against the lunar location, but in fact the deviations are very small, and more to the point are very *slow*, so that simple star trackers can be used to provide as precise corrections as will ever be needed. For most applications no corrections at all will be required beyond the ability to make slight changes in the basic ½-second-or-arc-per second tracking rate. Even a drive which is off by the ghastly amount of one percent would have to run for over six minutes to generate an error of 0.1 second of arc.

One should not, by the way, confuse the *actual* librations, the gravity-gradient pendulum motions, with the *apparent* librations as seen from the earth. Most of the apparent libration is caused by the moon's axial tilt, by the fact that the moon's orbit is not quite circular and by the fact that our point of view changes from moonrise to moonset by 8,000 miles. Relative to the stars the actual librations are very small.

Another factor that makes the moon appealing is its unlimited heat capacity. We are working right now on a small photometer—a site-survey instrument to measure the lunar sky brightness—which will be operated on the moon some time in the early 1970s; our solution to the temperature problem is to sink a rod into the lunar surface, and then insulate the outside of the instrument so that most of the heat-flow will be in or out of the ground. The horrendous temperature changes often quoted for the moon's surface apply only to infrared measurements of the outer layer—a layer perhaps a tenth of a millimeter thick, if that much. Measurements made using longer (radio) wavelengths, which emanate from layers a meter deep, show practically no variation of temperature between high noon and the end of the following night. It looks now as if the

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subsurface temperatures are around 220 degrees Kelvin, or roughly 50 below zero Fahrenheit. Solid-state circuits can be made to work quite nicely at such temperatures, and photoelectric cells become very well behaved when chilled so far.

We don't need to worry about getting rid of heat from power used in the circuits, because it is dumped into the moon's capacious interior. The same principle, on a larger and deeper scale, can be employed to get rid of any desired amount of surplus heat. This is important, because the only way to lose heat in a vacuum, other than by direct conduction, is to radiate it—and radiation efficiency is rather low until temperatures become high. In a space station containing many power-using devices, including people at one hundred watts per head, getting rid of heat can become a problem.

There's more. For half of every month, the only light on the moon's surface beside starlight comes from the earth; since the earth moves in the sky only about 7 degrees from its mean position, a simple umbrella can shade the lunar telescope permanently from earthlight, and scattered-light problems are nil. The sky on the moon is bound to be darker than the sky seen from close earth orbit, because the moon has no magnetic field and hence no auroral effects in its outer atmosphere or in its outer atmosphere or in its radiation belts; this can be especially crucial for ultraviolet work. How can one do an ultraviolet survey of the sky if he can't tell the difference between local and distant UV radiation sources? The only way I can think of is to examine each photon to determine its age.

The moon is also a much safer place for men than a close earth orbit. We are not likely ever to be able to shield completely against solar outbursts—some solar storms generate enough radiation near the earth to kill a man with an hour or less of exposure, and often the first sign of a major flare arrives in the form of an abrupt increase in radiation. Near the earth the magnetic field does provide some shielding, but it also traps and stores particulate radiation—electrons and protons—so that the belts get charged up more and more the longer the outburst continues. On the moon, when the storm is over the radiation ends. Also on the moon the shielding is free; all one needs is a cozy hole in the ground, which he would probably want to dig anyway just for heat-control purposes. At night there is no danger at all, since the solar radiation is not carried around to the night side by magnetic lines of force.

It may prove to be important to maintain a gravitational field or its equivalent; there appears to be a disturbing response by the bones to zero-G conditions, which makes them lose calcium and get soft. The

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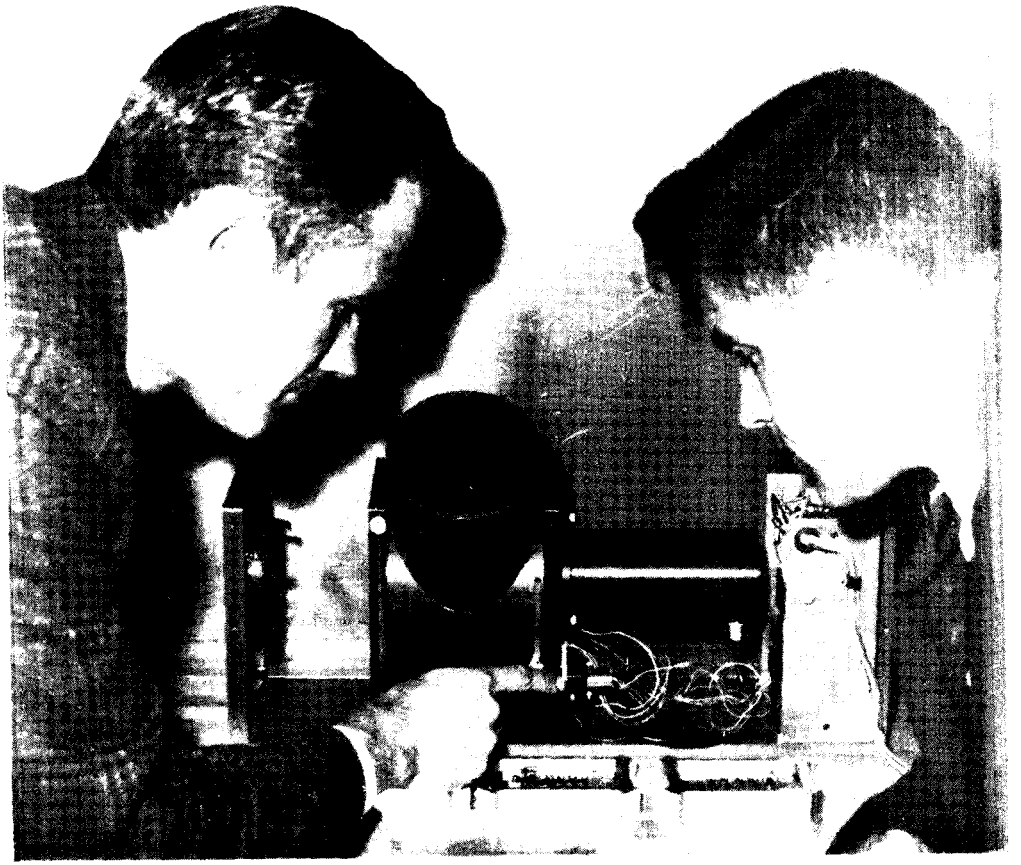

... astronaut ... scope. We are building this prototype of a site-survey ... telescope, a monster of four inches aperture. It is to be set ... on the lunar surface and started up by an astronaut. (That's our ... astronaut Karl Henize, on the right, and our space projects director Jim Wray on the left.) It will run for a year, mapping background skylight and stars in six colors. It will, it will, it will . . .

bones are not just sticks of hard material, the turnover of matter in the bones goes on just as rapidly as in other softer cells. One must think of organisms as standing waves on a stream of matter; nothing is permanent but the shape of the ripple. When gravity is removed, the shape of the standing wave must change, and the changes may prove irreversible or fatal. In a space station artificial gravity can be maintained by using centrifugal force, but unless the station is very large that is

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not a good solution; the shape of the artificial gravity field generated by spinning is all wrong because the field increases as you go down, and there are weird gyroscopic forces generated when one moves. Not only that, but it becomes very difficult to operate instruments from the station itself if it is spinning. One must think in terms of living quarters separate from working, non-spinning, quarters. On the moon, of course, there is a uniform and properly-shaped ⅙-G field which *may* be enough to keep the standing wave from damping out altogether.

Of course the very largest telescopes that will ever be built will be in orbit—probably in the Trojan positions 60° from the moon in the moon's orbit, because of the need to eliminate gravity-gradient effects. So far, the largest instrument being talked about for close earth orbit is 120 inches (yum!), with the limit of size being probably on the order of 1,000 inches in that location. There is no inherent reason why one could not build and figure a 10,000-inch mirror (0.2 mi.), assembled in pieces in far orbit, permanently shielded from direct solar radiation and earthlight by sheets of aluminum foil, maintained in shape by active servomechanisms. Such monsters will never exist on the moon, and they are a long way off. It is possible that lunar telescopes could be built with apertures of 1,000 inches; the telescope optics themselves would never be shipped to the moon, but would be produced, from local materials on site.

Eventually there will be not just one but two major lunar observatories, one at each pole. Both will be situated in small crater-bottoms; the walls of the craters will be built up by thin movable shields that block the light from the sun and from the illuminated ground surrounding. There being no atmosphere on the moon, there will be no glow from over the horizon; just a lovely optical silence, with perfect night permanently overhead. The sun will never rise more than 6.5 degrees above the horizon.

A well-staffed observatory on the moon, complete with the means for making air and water, possessing living quarters for a dozen scientists and as many assistants, linked to earth by monthly shuttles, probing to the very limits of cosmological time—what a dream for the distant future! How distant? Well, when I try to answer that question I have to pause before emitting the kinds of numbers that come automatically to mind, such as, say, forty years. I have to think back to 1956, twelve years ago, and wonder what I would have said if asked how long it would take to launch a 300-ton rocket intended to get men to the moon and back. It's pretty certain that I would have been wrong. So I'll make a correction to the "natural" guess, and say fifteen years. That seems so preposterous that it may even be short enough. ■

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The Steiger Effect

It took Science two thousand years to discover that air pressure existed—even longer to learn about gravity. So—we know all there is to discover now, do we . . . ?

BY BETSY CURTIS

Illustrated by Leo Summers

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Hello, Roger, boy.

I'm recording this on Clisp (a trade planet in the Sirius sector—population 84 million, humanoid, Earth: Tuesday, January 7, 2483; the local date system wouldn't make much sense to you) where I'm stuck for two years unless . . .

Yes, of course I've got a favor to ask. You know you practically never hear from me except at Christmas—unless I want something from you.

It's a long story; and I'll tell that first before I ask.

It starts with the Steiger Effect, which is a story in itself, though you've probably experienced it under another name so I won't have to explain it too thoroughly.

Ken Steiger and his son, Bud, were our garage men—sold fuel, did repairs and inspections; they had a counter for bakery goods, soft drinks, candy and stuff—near where I lived when I was a kid on Earth. Ken, or Bud, sanded my sled runners when I was a kid and inspected and repaired (and gave me credit on) my first hellies when I was a teen-ager. They took care of Dad's space wagon and surfacer for years. They sort of babied Dad and made allowances for his professorial absentmindedness by calling him up and reminding him about inspections and stuff. They were . . . well . . . hesitant to suggest repairs for fear we'd think they were trying to make money out of us. But, when Bud Steiger would say: "Dr. Hanley, I think the counter-cam is wearing badly on the surfacer," Dad always said, "Fix 'er up, Bud. You're the doctor on this, not me." Bud helped Dad buy each of his secondhand surfacers and the two different space wagons he owned during his life. We had a family saying about the way they fixed things so well and for so long. "The Steiger Effect" we called it. There was more to it than that, as you'll see.

Well, I tied up with *Tinker II* about a year after you and I graduated from Business Admin at Harvard, ten years ago. Turned out that Dad left me quite a pile—more than you'd expect a paleontology prof to have—and I was looking around for an investment that would use me, too.

We loaded *Tinker* up to and including part of both of her air locks with junk. Oh, good junk . . . samples of everything from glass beads and pink phone extensions to cranes and bulldozers; pre-stressing concrete forms, and aspirin, liquor and mink-lined sweatshirts. *Tinker*'s big. She has to be big to carry all the trade goods she does. She was called the *Victoria Regina* when she was a warship of the Queen class. We got her as surplus after the King class took over. Even so she was scarcely big enough for all the stuff we thought we could sell off-world. "We" is Bill deYoung & Company. All of us investors double as crew. Each one picked the stuff for his

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own share of the investment. Maybe you could guess this star-going junk-mine goes by the name of *Stinker Stew* when we have to unload something far back in the storage space.

Remember Sindbad the Sailor? They used to do things this way centuries and millennia ago. Buy up a lot of stuff, join a gang of merchants, hire a ship and call at every port to sell and trade.

Legend has it that Bill deYoung can sell cryocribs to Moonmen, sunlamps to Mercurians, and table salt to Aldebaraneans—where the big salt deserts cover a third of the planet—but business was terribly slow when we hit Clisp.

They were nice enough, but there didn't seem to be much they wanted. They liked pretty things—we'd picked up some of the lesser objets d'art from a couple of planets just about as cheap as the glass beads we'd started with. In case you don't know, every such trading expedition carries at least twenty-four solars worth of glass beads for good luck. These days that's about a hundred-liter drumfull. Usually nobody can be conned into buying them, so they come home each trip and don't have to be replaced. But we still carry them for luck—some old story about a fantastic land sale for twenty-four somethings of glass beads and junk. Traditional trading goods with ignorant savages . . . we can always hope.

The Clispians weren't savages but they liked the beads—gave 'em for incentive payments to their laboring class (slaves?) whom they called Boys. (The word means Immatures, or with-the-body-doers, as opposed to our customers who called themselves Men, or Matures —with-the-mind-doers.) The Men own all the land—probably conned the Boys out of it centuries ago—and set up households, work plans and schedules for the Boys and paid them with the produce the Boys raised in the first place. Sort of a sharecropper deal with a kind, but close-fisted, father. Anyhow, the Men didn't turn out much to pay the Boys with—they wouldn't think of dirtying their own hands with manual labor. But the body-doers kept the whole works going with farming, building, and the service trades. Well . . . not trades. The Men had so little to trade but fatherly advice.

The Men didn't want us to leave, even though there wasn't much they wanted to buy—visitors were rare . . . they were sociable—and we knew things they wanted to know. But all we could get rid of were some vases from Sorla; tapestries from Prando; glass beads and nothing else. So Bill sent Ching—anthropologist and trader; Fontecchi —biologist and trader; Iver—geologist-physicist and trader) and me (merchant—that sounds better for somebody with no second specialty beyond trader—to case the planet

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situation and look for possible needs the Clispians might not be aware of.

Ching predicted that the culture would die on its feet in a few more generations because of the declining birthrate among the Boys and the increasing birthrate of the Men. Fontecchi analyzed the birthrate thing and handed the problem back to Ching when he discovered that it was cultural rather than biological —the Boys were holding down their numbers on purpose to increase the rewards for their services. They were using a discovery of a Man scientist who had found a sterility drug in the course of basic research on mammalian physiology. The Men were increasing because of the tremendously powerful sermon-poems of Curgh-Holta. (Have you read these? Their off-world sale has been incredible.) Curgh-Holta, a couple of centuries before had extolled the pleasure of mere existence to think and enjoy one's friends and family.

The chief thing we were able to get in trade in any quantity from the Men—the Boys didn't own anything to trade but their own muscle power—was thousands of scrolls of poetry. Even their fiction and philosophy and science were poems. Everybody and his brother and particularly his mother (they have a sort of semi-matriarchy among the Men—which reminds me that I still find it a bit confusing when I get to talking about boy-Men and men-Boys and particularly about women-Boys. By the way, the local gals, both Boys and Men are gorgeous, for what it's worth, though the women-Men are often plumper than my taste appreciates) write poetry. They hadn't invented printing, and when we offered a printing press there weren't any takers—because few of these continuous writers were really interested in reading *other* people's poetry in enough quantity to make presses pay off. But small individual duplicators sold like hot dogs at a county fair—to use a western-Earthism I hope you're familiar with.

The natives had already discovered and used some fossil fuels for heat and light, but Ivor discovered several new oil areas and clays for all kinds of purposes, from porcelain to concretes.

The Clispians didn't have what we'd call a materials engineer—engineering is too much of a combination between abstract thought and body-work for them—so I worked up a quick extra specialty with the aid of the *Tinker*'s library. The Men were intensely interested in everything they could use as something to think about and understand—their intellectual culture is fantastic but they don't give a hang about putting their ideas to practical use. Practicality is left to the Boys who don't get much education because the Men think it would be cruel to make people study who don t like to do it. The

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Matures pride themselves on their kindness—so the Boys are ignorant.

I managed to get together some classes for the Men—particularly the younger boy-Men—on the potential architecture of Clisp if they were to use pre-stressed concrete. The more gifted of these kids drew beautiful sketches or made fancy mock-ups of how the buildings would look. The other half of them went home to write sense-of-wonder poems about living in minibuttressed spires and domes and such. But they didn't build any, attractive as they found the idea, because they said that was work for Boys—if there should ever be any who could understand how to operate the machinery.

So we went to the Boys—oddly enough it was the men-Boys who listened—with the sketches and mock-ups and told them that they could build like this and farm like that—meaning vast fields of grain and vegetables and loaded orchards. The illustrations in some of our catalogs were fantastically mouth-watering. At their present level of technology they wouldn't have been able to grow or harvest stuff like that but, if they would and could use the tools we'd brought, we told them the pay based on that kind of production would be more than they could use . . . more food and glass beads than they'd ever dreamed of.

We should have gone to them first, but the Men, as landowners, had looked like the dominant class and the best prospects for consumer goods. Actually they were markets for only the consumer goods the Boys produced—very modest in their demands and no concept at all of what they contemptuously called "things-treasure." The Boys were enthusiastic, even when we told them that they'd have to get a considerable amount of education—reading at least—to use the equipment. Who would pay for the education? Papa-Man and Mama-Man were more than willing to finance the toys for their dear Boys—provided we could find a market for their poetry—which they had never had any success in giving, even verbally, to the Boys.

We worked out a deal.

However, the Boys were as firm as the Men had been about not wanting any equipment that ran by magic—which was their name for psi talent. They admitted that there had been occasional witches among them through the centuries—enough so that there were kids' stories about witches and fairies. The Men's disapproval of magic, for which they had no genetic potential, had long since seen to eliminating the genes from the Boys' heritage, too.

Our geologist had located more oil areas, resulting in the sale of drilling equipment—first big sale . . . on credit of course—and we set up diesel oil plants. At the same

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time we held classes in their operation, and in the physics of internal combustion engines, to convince both Men and Boys that these fuel engines operated strictly according to the physical laws of all universes and not because of requisite genetic abilities of the operators.

Gasoline engines we couldn't sell to Men or Boys because of the electrical ignition system. Even electric sparks were beyond their credibility. Bill deYoung himself tinkered out a minidiesel starter for the regular diesel engines. (You light it with a match—matches they had already.) They still insisted that electricity was a sympathetic magic they would never be able to work Oh, well, I don't know what they'd have made of a gas-cracking plant anyhow. When they were determined they couldn't run something, they couldn't, for a fact.

So we got engines humming and throbbing; oil wells flowing; Boys —and I mean *men*—sweating out days in greasy overalls learning engine upkeep and teardown. These were some of the hardest working customers it has ever been our luck to see. And fine mechanics!

It took us only a couple more months to get farm engineers (Men) and building contractors (Boys) going like jets on programs which we helped them set up. Then we got off-planet as fast as possible to find customers for the poetry and stories and deep philosophy which were the sole stock in trade of the Men—and which some of us had the tendency to think of as so much spoiled paper.

I confess I'm not much of a reader and I was dubious about our investment in "delicate imagery" involving native flora and fauna of one small backwater planet and analogical reasoning based on physics which I don't begin to understand.

I needn't have worried, with Bill's help the stuff sold and sold and sold! First printing rights here; reprint rights there; tri-di adaptations and recording, and even editions for the blind on one planet. It must be good—I really wouldn't know except that the solars poured in. By now even you may have read some of it. I remember you always read yourself to sleep.

It was over a year before we got back to Clisp, and when we did . . . OOF! It was a mess. Not, fortunately, the mess of rusting junk you might expect when the engines failed to perform. The teardown crews had disassembled everything and got it under shelter and coated with oil. Construction was just where we'd left it the year before, and farming was still the hand-and-beast-type operation it had been There had been something of a food shortage since we left about the middle of the previous planting season. The Boys had had such high hopes about being able to plow and plant twice as fast in ten times as

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much ground even the first year that they'd been late with the plowing and planting when we left. They soon found out the tractors, concrete mixers, bulldozers, cranes, and the plants for making fuel for them, simply would not work.

Would not work? Everything worked fine except the internal combustion engines that were intended to supply power, run the fuel plants, and so on. They had enough oil in the tanks when we left to light the whole planet for a decade, already, but . . .

The moment we left the planet's orbit, everything had simply quit.

Of course the Men had refused radionic equipment . . . so they couldn't let us know.

You should have heard 'em yell when we got back. They were all for having us lynched. (In their culture that meant a year's solitary confinement—they are a gentle people and very sociable.)

Bill managed to hold them off with the report on the popularity of their writing till we could get a tractor or two back in running order to find out what had happened. The tractors took off with full power as soon as one of our boys lit the starter.

But stopped again as soon as we took off for the starry black.

We'd told 'em we'd be gone a week, to see if they couldn't operate the stuff in our absence.

And they couldn't. Just couldn't. The engines simply didn't turn over. Or rather, they couldn't be cranked over. Just acted like everything froze up.

Actually we came back in two days to be sure they weren't pulling something while our backs were turned. And they weren't quite so mad this time because several of their scientists had got the same idea.

They'd found out what they suspected . . .

They staked some of us out in the hills and on boats out from shore . . . and up to one hundred miles from one of us—with our ship off-planet again—the engines operated fine; farther than that they began to sputter and stall. At a couple of hundred miles they were stalled cold; and no amount of cranking could bring a pop. When the ship came down and all the crew were groundside, they would get action up to a thousand miles or better.

Turns out the internal combustion engine runs on some psi law instead of totally on physical. Can you beat that? Psi power most humans seem to have. Even me! And we never noticed.

I suppose we might have guessed it ourselves if we hadn't been blind to something we were so used to.

Some people have it more than others.

The Steiger Effect.

You see, it's too common a phenomenon for us to pretend it exists except as a common joke. My fam-

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ily called it The Steiger Effect and your family probably has some other name for it—if you drive your own transportation or even have a common tri-di set for the kids. You'll recognize it immediately now that you know. Like when the helly develops a bad rattle somewhere, or it's hard to start on a cold morning, or something seems to be breaking down . . . so you call the garage for a time to bring it in for an overhaul. You somehow get it going and then a mile or a half mile, or specially a quarter of a mile, from the garage the engine suddenly starts to sound fine and smooth and in perfect condition. By the time you run it into the repair garage, it sounds like a new engine. The mechanic says, "Not a thing wrong with *this* motor, friend . . . you got a mighty good buy on this one." You can't convince him that yesterday you were sure it was falling to pieces or something. That's the Steiger Effect . . . like taking a sick kid to the doctor and having him feel full of beans the minute you both walk into the doctor's office.

Oy! What have I said? Doctors, too, huh?

Anyhow, I was elected to be one of the gang stationed around the planet so the machines will run. Captain deYoung took over our share of the cargo and is going to try to recruit human beings for the job, so we can be released. If we hadn't agreed to stay, there'd have been trouble and our whole investment-plus might have been lost in making reparations to the Clispians.

So what all this leads up to is, you want a good job, off-Earth? Please? I'll guarantee to double any salary you can get anywhere else. No real work to it either, if you like occasional puttering with machinery—which I know you do. Anyhow this is why I thought of you.

If you'll come out here as a local magic-man, I can get back to selling, which is my real business.

I don't know if you're married yet, but if you are, it's a good climate and the cultural opportunities are fantastic. You can hire out the kids as magic-men as soon as they're ready to leave the old apron strings.

How about it?

Or do you know somebody else who'd like a good job?

Hoping to hear from you soon.

Your old college roomie,

Steve

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UNDERGROUND

Quite an underground! Very active, very secret—and a good half-mile underground!

By LAWRENCE A. PERKINS

Illustrated by Kelly Freas

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"Mmmmmf!" mouthed Senator Burleigh against his gag, straining uselessly against his bonds. Somebody had been very thorough. At least he could see, although the only thing visible in the dim light was a lumpy wall a few inches from his nose.

Burleigh feverishly tried to remember what had happened. Not to be able to move, to take charge, to be in control, was intolerable. *Think!* he ordered himself. He remembered dinner at his hotel clearly enough, after which he'd had a single brandy at the hotel bar. After that there was only confusion, dizziness, and darkness.

Hearing footsteps behind him, Burleigh made a supreme effort and heaved himself over, very nearly falling from his narrow cot. Alertly approaching him was a small, chunky, uniformed man. The light was much too faint to illuminate the man's face, but Burleigh could see that the room was bleak and bare.

"Ah, Senator!" The man's voice was deep, crisp, and slightly accented. "How stupid!" With quick fingers he removed the gag, talking. "This should have come off when you arrived. We of the underground are civilized persons. There should not be unnecessary discomfort."

"What the hell is going on here? What is this?" demanded Burleigh, struggling to sit up but resenting the other man's quick help. The senator could see now that the uniformed man's chunkiness was all muscle.

"Ah, Senator, I am afraid that you come at a non, ah, inauspicious moment, as you would say. All the world knows that you, chairman of the powerful Yanqui Foreign Relations Committee, are personally investigating your nation's aid to our nation. And you are going to recommend that this aid be stopped; possibly you will even recommend sanctions against us."

Burleigh wrenched briefly at his bonds, hating to be unable to use his hands. "You can tell Brazofuerte that he'll never get away with this! As soon as my people realize what's happened, they'll send the Marines. I'm a member of the government of the United States! D'you know what that means?"

The chunky man took half a step backwards. "Ah, you think that I am a creature of Brazofuerte? I spit in the milk of his mother! If all else goes badly, our final hope is that your Marines may indeed come. But our hope is that our revolution may be entirely, ah, indigenous."

"Who are you?" snarled Burleigh.

"Ah, you may call me Pablo. And I see that you are thinking, this Brazofuerte, this President-Dictator, has ruled the country with the iron hand for so many years that there now can be no effective organized opposition. And now that he is about to join forces with Eastern Big Brother . . . eh? . . . you think that now a revolution is twice-over impossible."

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The politician in Burleigh took over. He made his first quick approximation of Pablo and acted. "I think my arms hurt. If you're against Brazofuerte, you're for me. Why keep me tied up like this? And where are we? What's going on, anyhow? What is all this?"

"Ah, I believe that you are correct." Pablo stepped forward and then hesitated. "But first—I wish no harm to you, but I hold the jujitsu Black Belt. Also I am the master of karate, aikido, and savate. Ah, where are we? This is part of a chamber hewn out of bedrock, a number of kilom, ah, miles removed from your hotel." Muscular fingers began unbinding Burleigh's ankles. "Remember—move to escape and you have only yourself to blame."

When his wrists had been freed, Burleigh very carefully stood up. He might be killed at a blow if he made an unexpected move, and his cramped limbs were not entirely controllable. But he had to assert himself, even in the rockbound bowels of nowhere. Taking one tottering step, he very carefully stretched.

He was surprised to find himself fully dressed. Hadn't he been in bed? No, he'd merely been trying to get to bed. Shaking his throbbing head and then vigorously massaging his temples, he looked around. Two adjacent walls and the ceiling were rough rock surfaces. Everything else was rough concrete, and the almost crepuscular light came from crude niches in the concrete walls. The only doorway was in the shorter concrete wall.

Burleigh stared harder. Except for his rude folding cot and the two men, the room was utterly bare. His subconscious surprised him with a campaign slogan for being captive in caverns: Bleak and Bare is Burleigh's Fare.

He took another careful step. Not only was his head roaring—he was oddly dizzy. Bleak and Bare indeed! Rubbing his forehead, he fought with his only weapon: words. "All hell's going to break out tomorrow when they miss me. Some of my constituents are already yelling for a punitive expedition. You must know that the only reason I came down here was the President's personal insistence."

Glancing at the rocky ceiling, Burleigh regretted the words "down here."

"Ah, we have devoted some time to your visit with us. One of your countrymen wrote a note telling how you are going mountain climbing. One of my countrymen with a history of signing the names of other people . . . eh? . . . copied it in your handwriting, on your stationery. The same one who, ah, spiked your drink is delivering it."

Burleigh felt the first twinge of fear, and his fear made him angry. Could this sort of thing happen to a United States senator? The old banana republic days and Pancho Villa episodes were over, weren't they? His rage gave his voice incon-

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gruous authority. "I demand to know what this is all about!"

"Ah, I have already explained. You were ready to tell your President that all aid to our country should stop immediately. We feared that you might even recommend sanctions against us. We could not allow that to happen."

"Why, you . . ." Burleigh suddenly remembered that he was alone, unarmed, underground, and in the presence of a self-proclaimed expert in bare-handed killing. "Not allow?" he croaked.

"Senator, in this year of Our Lord Nineteen eighty-two, many things have changed. In other things there have been no changes since the days of the Maya theocracy. We have our ways. A large and necessary part of your foreign aid reaches our underground—and you will discover that in all the history of the world, we are the most truly an underground."

"What . . . what d'you mean by that?"

Pablo, waving for Burleigh to join him there, sat down on the groaning cot. "Brazofuerte has more soldiers per inhabitant than any other nation in the New World. He also has masses of armament—railroad guns, tanks, jet airplanes. To buy them, he has bled our nation white, of course. All telephone lines are tapped; every fifth man is an informer. How, you ask, can there be an underground?"

"Well, yes. How?"

Pablo laughed briefly and bitterly. "Ah, you see, truly we are underground. All but a few, very trusted, very well checked, very well trained. Such a one is a bartender at your hotel."

Burleigh, gaping, began to suspect that he was out of his depth in at least two ways.

Pablo laughed again even more sharply, like a fox's bark. "How many men, equipped as rebels must be—no airplanes, no tanks, not much cannon—do you think I need to overthrow Brazofuerte?"

"How many? Millions! People—except police or armed services—aren't allowed to have weapons, and you couldn't even bring in rifles through the radar and sonar nets! Besides which, the Organization of American States wouldn't allow any foreign-based invasion—not even a foreign supply of arms to rebels. You wouldn't have a chance!"

"Ah, no chance—except for my underground. And this underground, you must know, will strike in a little more than two weeks—unless, of course, your report should be sent. Then Brazofuerte would grind his security much tighter—very much tighter. Our very necessary supply source would be cut off twice over—by you and by Brazofuerte." Another fox bark. "And the underground would be buried."

Burleigh, who was accustomed to being the one with all the information, squirmed. Yet, considering the

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circumstances, he was being given quite a few facts; again, a thrill of fear passed through him. "Why are you telling me all this."

"Ah, we know of you, Senator. You believe always that you are right, but you are not stupid. Our very clever note in your handwriting gives us three days, but we need three weeks. We need your report to give us three weeks. Therefore, we must tell you things and show you things. We must rely on your intelligence."

Burleigh wondered if he would hear and see things much longer. Breathing deeply, he found being alive a surprisingly dear thing—but he was not for sale. If his life was the price of unbending opposition to Brazofuerte's cancerous dictatorship, he would pay. As a politician he knew how to make deals, and how to get out of them, but the safety of the United States was not negotiable.

Pablo appeared not to notice the senator's reaction. "How shall we convince you if we do not tell and show? You believe that Brazofuerte is evil but cannot be overthrown . . . eh? . . . you have just said so. Therefore, you must hear and see how he is to be overthrown. We need you with us."

"You want me to join your rebellion? But I'm a citizen of the United States! Hell, I'm part of the government of the United States! You must know . . ."

Pablo raised a brawny hand for silence. "I regret my poor English. We need that you be here. Have I spoken of joining? You have this report to write, is it not true? Therefore, you must be here and see things."

Again Burleigh heard footsteps, and suddenly he realized that at least some of the background noise was real, not a roaring in his own ears. There were vaguely industrial thumpings riding over his tinnitus. Suddenly, escape seemed possible. Moments ago he had accepted martyrdom with a calm that had surprised him, but with renewed hope came renewed fear.

The footsteps approached, and a tall, thin, slightly stooped man walked through the doorway. "You want to see me, chief?" the man rasped, plucking a cigarette from his mouth so that he could speak and then falling on it for three quick puffs.

Pablo nodded his head and then cocked it at Burleigh. "This is Senator William W. Burleigh, from the United States of America. Soon he must report to his government about continued aid to our country. We have, ah, removed him from his hotel so that he may have the underground view."

"Sheesh, a senator!" The stooped man coughed dryly. "Golly, are you going . . . ?"

"I am," Pablo brusquely cut him off. "Senator Burleigh, may I introduce to you a countryman of yours?

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One who has joined with us in his dedicated opposition to Brazofuerte? Ah, Andy, I wish that you will explain to the senator about our underground. All. Everything."

Andy strangled in a cloud of cigarette smoke. "Everything?"

"Everything. Make no reservations."

Andy's young face reflected a quick series of strong emotions. "Uh! I guess you know we're in the Ring of Fire. Or maybe you don't. Geologist's name for the belt of volcanoes that runs from Cape Horn to the Aleutians, up the west coast, then down through Japan and the Philippines—and Malaysia, too—through the volcanic Pacific islands to Antarctica and back to Cape Horn."

Burleigh listened intently, wondering what the Ring of Fire had to do with the kidnapping of senators.

Andy glanced at Pablo's impassive face for a moment before continuing. "There aren't too many of us. Guns-and-bayonet assault against Brazofuerte would be wiped out in a couple of hours. Only reason we survive is that we're underground—really. Topside, somebody'd slip and Brazofuerte's hounds would have us in minutes. Hopeless."

Burleigh wondered how hopeless his own situation was. "Well, probably," he agreed, "but what d'you mean by 'topside'?"

"Topside? Up top, of course." Andy quickly puffed a fresh cigarette to life from the embers of his last one. "Guns, bayonets, we may need some. Tanks and airplanes, no. We've got the whole planet."

"I beg your pardon? Not even your next door neighbors dare get involved with Brazofuerte, and even Pablo admits that the radar and sonar would . . ."

Exhaling blue smoke, Andy waved for silence. "Who needs people or countries? I said the planet. Earth, the world. *Terra firma.* Any idea how many A-bombs it would take to equal the blast of a volcano? Hundreds, hundreds. But the bomb is all done in a few seconds. Some volcanoes have been in violent eruption for centuries. Any idea how much energy El Sangay's put out in the last four hundred years, constant eruption?"

"No." Burleigh thought about volcanoes. None in his state, of course, but there was Mount Larsen on the West Coast somewhere. Something in Andy's voice made the senator think of Pompeii and Herculaneum and destruction. Volcanoes?

Andy talked on, obliviously. "Beyond comprehension. And you know, there's a magma pocket six and a quarter miles from here that we could channel into Brazofuerte's bedroom? Zeroed in on it by Earth magnetism readings. And volcanoes don't care where they go. Back in the States some of 'em bypassed the Grand Canyon and then spilled lava into the mile-deep gorge."

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Burleigh had never seen a live volcano, but he had read about Pompeii and Herculaneum. And there was that volcano on Martinique, Mont something-or-other, within television range of Miami. It had wiped out a whole town, a whole electoral district, in half a minute. Some poor voter had been buying a bag of nails, and the volcano had melted the nails before the paper bag had had time to burn.

As Burleigh wondered how an elected official could explain away something like that, his face mirrored his horror.

"Yeah, that's what we figured," Andy agreed with the senator's face. "But there's always an earthquake. Same forces that cause volcanoes cause them. Twisted stratum of rock and a way to break it at the right place is all you need. Break a twisted stratum and it snaps like a spring. Lots of energy in a good stratum. Snap of half an inch can raise holy hell."

Burleigh had been able to absorb waking up with tied hands and feet, and he had accepted his ego-bruising interview with Pablo. But meeting a man who talked about setting earthquakes was too much. His drink at the bar had been doped; was this a drug-induced hallucination? "And you're twisting these stratums?"

"Strata. Plural of stratum is strata. Latin. No, we're not twisting 'em. But we know where they are, and down here we can break 'em where we want to." Andy lit a fresh cigarette from the finger-staring stub of his last one and glanced searchingly at Pablo. "We're mostly digging in certain places, replacing the natural subsoil with thixotropic clay."

"Thick . . . what?"

"Thixotropic. The kind of clay that Anchorage, Alaska, was built on before they pumped it full of chalk. Big quake in Sixty-four, the stuff turned liquid and Anchorage got clobbered. Made of flaky particles, and the water in it is just about pure—no dissolved electrolytic salts. Most clays are full of salts like calcium carbonate, keeps the stuff bonded."

"Ah, Andy, would it be possible for the senator to view some of our operations?"

Before Andy could answer, Burleigh demanded, "Where are we now? What is this place?"

"A reasonable question." Pablo smiled fleetingly, and Burleigh suddenly noticed a number of small scars on Pablo's swarthy face. "I have stated that this is the underground. Truly. Have you not noticed the heat? We are deep enough for that, although we have pride in our air system. We cannot allow that there is a hot air blast at the surface."

Burleigh glanced at the roughly chipped rock ceiling, and his recent notion that escape was possible faded away. He felt very small and very trapped, and hated himself for

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feeling that way. He hadn't noticed the heat before, but now it struck and choked him. How many tons of strata were straining above him? He yielded meekly when Andy grasped his arm.

As the doorway revealed a brightly lit rock-walled cavern, Andy shifted his grip on Burleigh's arm. "Did Gen, uh, the man you call Pablo explain our setup? Only way out is the way you got in."

"I don't know how I got in. I was drugged and kidnapped. And there's going to be hell to pay when I'm missed."

Andy's grip loosened. "Sheesh! Well, I guess Pablo knows what he's doing. Only way out is the elevator. Longest elevator ride in the world, I guess. Operator's a man in a rock-bound cell half a mile away. Intercom and television, and the elevator won't move unless he knows you. Better stick close to me anyhow, you could get hurt real easy down here."

"This thixowhatzit clay—where do you find it, and how do you get it down here? Doesn't Brazofuerte wonder about it? Don't his goons watch out for things like that?"

"They do, they do. That's why we mix our own thixotropic clay down here. Fortunately for us, our geology is very like Alaska's, except for the clay. We dig our clay, treat it, and then put it back under Brazofuerte's bedroom." Coughing dryly, Andy puffed another cigarette alight from the embers of his last one.

"Treat it? You mean you . . ."

"Yeah. We sluice it. Lucky for us, there's a little river not far from here. Melting snows from a couple of mountains. Damn near pure, and clay with a little electrolyte in it can still be thixotropic. Hard to dry it afterwards—we squeeze it. Heat helps, and we dump the heat in that mountain river."

Burleigh saw where the industrial noise was coming from. Dozens of laborers, most of them swarthy men with long black hair, were trundling barrows, dumping clay into long sluiceboxes, stirring the glop with long-handled rakes, and controlling the flow of water through the boxes. Others were ladling the glop from unstirred boxes and trundling it away in dripping barrows.

"Noisy, way the bare rock echoes. But you'd be surprised. We keep it as quiet as we can. Barely pick it up half a mile from here. Be hell to pay if Brazofuerte's sonar ever hears it. But he's not . . . hey, hey, look out!"

Dropping his cigarette, Andy grabbed Burleigh and violently yanked him out of the path of a barrow. "Sheesh! Watch out for those fellows. They get good pay, but they work because they hate Brazofuerte. When one of these guys grips the handle of his barrow, he's strangling Brazofuerte. Anything in the way is Brazofuerte. Watch out!"

Andy lit a fresh cigarette, tossing away a crumpled empty pack. "Stick close to me. Easy to get hurt down

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here." They fell into a procession of men trundling barrows to a sort of gondola car at the end of a ramshackle track that vanished into a tunnel. Half the size of a standard railroad car, it rested in a deep cut that put the rim of the car at cavern floor level.

At the near end of the car, an inscrutable man stood on a broad floorboard, one hand indolently lying on a control lever and the other draped over the handrail. Leaping onto the footboard, Andy said something in the local Indian dialect and then beckoned for Burleigh to join him. "Hang on tight. Cart's about full." Pointing to the lever, he added, "Electric. Cadmium batteries. Anything else would foul the air, make too much noise, or be too much trouble."

Burleigh tentatively gripped the handrail, finding it dank and greasy. "Tell me something. However did you do all this excavating if you can't make noise?"

"TNT when we had to. A real bang sounds about like a minor earthquake, and who expects TNT this far down? Where we don't have to blast and where we can't blast—that's around our twisted stratum—we use diamond dust in water under pressure. And men with picks and shovels."

"Diamond dust?"

"Industrial grade—not too expensive. And we use it over and over. Have to recover the water anyhow."

"Oh?"

"Yeah. Found out back in '66, in Colorado, that voiding water deep in the earth sets off miniquakes, hundreds of 'em. Lubricates the faults, makes 'em slip easy. Last thing we want down here. One, all that seismic activity would make Brazofuerte suspicious. Two, we want to save that energy for our own palace-shaker. So we recycle the water."

"Doesn't that require a lot of power?"

"Glad you asked. Bootleg tap on a topside power line does the job, also circulates air, also recharges this cart. Brazofuerte spends million on his radar and sonar, but nobody watches the power lines. Minister of Power is loyal to the Party, but he can't tell an amp from a lamp. They say . . ."

Suddenly the swarthy man jammed the control lever against its stop. Headlights blazed out, and the car leaped forward like a stung stallion. Burleigh found himself belatedly hanging on to the slippery handrail with both hands as his feet skidded out from under him.

With a surprisingly quick and muscular arm, Andy seized the senator at the back of his trousers by the belt and hoisted him up to safety. "Sheesh, I told you to hang on! That's twice in ten minutes we almost lost you. You may be a senator back home, but down here you've got to look lively to stay alive."

"I'll ask you to remember that I was kidnapped," Burleigh panted,

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his arms tingling. He would be sore tomorrow—if he lived that long. Cautiously he moved his right hand to get a firmer grip on the slithery handrail. Beneath his insecure feet, the cart climbed as its motor groaned.

Suddenly the gradient leveled, and a point of light in the murk swelled to a circle that opened out to become a dimly lit cavern as the car shrieked to a halt that banged Burleigh painfully against its steel frame. As his eyes focused, he saw that the cart had stopped inches short of a bumper at the end of the tracks.

"Hard to teach 'em how to use machinery," Andy apologized, helping Burleigh down. "Can't quite understand that an electric cart isn't a llama. But—sheesh! From full acceleration to full reverse, and he missed the bumper by five inches. Could you do that?"

"Ulp. I don't think I'd care to try."

"Me, either. They don't understand machinery the way we do, but their ancestors were putting up monumental buildings as early as ours, you know. And they sure understand our Project. They want to be free people, not cogs in Brazofuerte's machine. At least they know that much about machines. Hey, maybe that's why they treat the cart the way they do!"

Burleigh realized that his left arm was already stiffening. He wouldn't have to wait until tomorrow for the pain. "You haven't told me exactly that this Project of yours is."

Andy thoughtfully lit another cigarette. "Gener, uh, Pablo did say that I could tell you everything. 'Make no reservations,' he said. We already agree how Brazofuerte's got the military power to smash any ordinary rebellion. And how the country'd get beat up at the same time. Right?"

"Right." Burleigh's right arm was getting stiff, too.

"But, if we can trigger an earthquake in the right place, Brazofuerte's government'll be out for at least an hour. No electricity, no radio, no transportation. Total confusion, right? Well I've got a twisted stratum with an active fault line half a mile from Brazofuerte's palace. And we've already set the charges to blow it in just the right place. May run down the fault line a few miles either way, but . . ."

"But even granting that you can turn on an earthquake, won't there be a lot of damage? Won't hundreds of innocent people be killed?"

"Sheesh, what d'you suppose happens in any revolution? But that's what the thixotropic clay is for. We've already planted a batch under the palace, and another one under the State police building. Right now we're three thousand feet under the main army barracks. If we don't get stopped in the next two-three weeks, we'll be ready."

Burleigh stared, forgetting his aches. The floor of the cavern

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seemed to be bedrock, but the walls and ceilings were shored up by wooden pallets held in place by a shaky corridor of long poles between two areas of furious activity. On one side, half-naked men flailed away at the native clay with picks and shovels. On the other side, equally industrious men were packing treated clay into the cavern.

"Tricky." Andy lit a cigarette. "This is the bottom of the subsoil. Can't make any noise here, and we have to keep shifting these pallets all the time—can't leave 'em in, and need 'em to shore up new work."

"Wait a minute. You go to all this trouble to produce a layer of clay that will act like water during an earthquake. Your earthquake will happen in three weeks. Why not just fill the cavern with water?"

"Why? It would seep away before we were ready. Fill this cavern with water, and in an hour it would be half empty. Thixotropic clay gives us the old hydrostatic paradox—equal boom at all places. And the runaway water would lubricate the fault lines, touching off miniquakes and ruining our stratum. And—sheesh!"

Dropping his cigarette, Andy began racing across the cavern. Moments later two laborers threw down their tools and took up the same mad dash toward the same destination.

As the men converged, Burleigh could see that they were headed for a spot near the side wall of the digging area. But however he strained, he saw nothing there. But now a dozen pick-and-shovel men began trotting in the same direction, carrying their tools.

Burleigh finally understood when a bulge in the wall slowly broke away and half rolled, half fell into the corridor in a surge of glistening clay. The surging earth mass threatened two of the poles. But before it could reach them, each of the racing laborers had thrown himself behind one of the poles as a human chock.

Yards from the poles, Andy checked his speed as the sluggish wave engulfed first one man and the the other. Almost before the clay stopped moving, he began directing the pick and shovel men who swarmed to him. Quickly and carefully the buried men were dug out. One of them shook himself and staggered away; the other one was laid gently on the soft clay as the men clustered around him.

Andy jogged back to Burleigh, panting. "Sheesh! Lucky!" He paused to catch his breath. "Lucky that those two were so quick, lucky that we saved both of 'em. Lost a lot of men that way. Most of a shift, once." He gestured at the prostrate man. "Wind knocked out of him, mostly. But if he can't get up when the rescue team gets here, they'll take him to that room where you, uh, woke up. Docs'll work him over."

Burleigh was still shaking. "Why did they do that? And were you going to do the same thing?"

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"Mostly that clay wall is safe. Underground has to trust it; can't afford frills. Odds aren't much worse than with explosives, and this is war. Revolution. Well, if that wall does let go and knock over a pallet prop, more stuff falls and knocks over more props. First time it happened, it took out every pallet and wiped out most of the men in the chamber. Of course, that area was smaller than this one."

Burleigh swallowed noisily. "Do you mean that . . ."

"That all of us could have got killed just now?" Andy snapped his fingers. "Just like that. And suffocation is a nasty way to go. But like I just said, this is war. Remember that Marine commander back in World War II asking his men if they wanted to live forever?"

"I've heard about it—but hell, those were tough Marines, combat-trained, storming the enemy. Most of your men aren't even soldiers—you said so yourself. And there's no combat excitement down here. A shovel isn't a rifle, and the men know that a blob of wet clay can wipe them out. How do you make them stay down here, knowing that? Not only stay and work, but be willing to sacrifice their lives for that work."

"Glad you put it that way. Most of these men are contracted laborers —right. Can't let 'em out, of course —just think what Brazofuerte'd do if one of 'em came up complaining about working conditions. That little room where you woke up was intended for defectors. But there hasn't been a one! Not a one! But don't let me get carried away. Anything else up here you'd like to see?"

There was not. And although Burleigh had felt twinges of claustrophobia in the bleak and bare chamber, he now vastly preferred it to a place where a sudden surge of moist clay could extinguish him.

Pablo met the cart as it lurched to a stop in the noisy cavern. "Ah, Senator, I trust that you had an interesting visit." Grasping Burleigh firmly by the elbow, he steered his involuntary guest back toward the little room with the cot, to which had been added two folding chairs. The two men sat down in the chairs, facing each other.

"You are an intelligent person. You know that Brazofuerte is evil. You see that we can overthrow him. Are you now ready to write the report to your President?"

Burleigh was no seismologist, but he believed that Andy's earthquake-making would work. Still he recoiled at being involved in the politics of another country. Twenty years ago it would have cost him his citizenship merely to vote in a foreign election. How could he get mixed up in a foreign revolution?

"What happens if I recommend that all aid be cut off immediately?"

"Ah, an intelligent man asks a not-intelligent question. This note which we wrote for you, it states that you will climb the most dangerous

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mountain in our country. A mountain famous for its rockslides . . . eh? . . . and other dangers. Should you write such a report, your regrettably crushed body will be found under such a rockslide. The witnesses to the accident are already chosen."

A clutch of fear wracked Burleigh's spine. Yet for a moment he considered daring Pablo to kill him. He had an inborn American love of freedom at any price. Was he going to let this Pablo buy him? The answer was obvious, even in a bleak and bare cavern in a far country.

Yet, he reasoned, didn't the earthquake project look sensible? And wasn't anything better than Brazofuerte? Wasn't it?

Trying to ignore the rockslide as an influencing factor, he remembered the two workers racing toward possible death. He considered this bleak and bare room and the fact that no defectors had appeared to populate it. He pondered on the fact that the room had been provided when it would be so easy to dispose of a corpse in these subterranean caverns.

Leaning back in his chair, Senator Burleigh enjoyed the relaxation of the man who knows that he has made a wise choice. "Have you got some writing paper?"

Sixteen days later, Burleigh was politely conveyed topside and released. The earthquake had been an alarming experience underground, and after the first dazzle of sunlight he could see signs of it at the surface everywhere. But little of the damage seemed serious, and the people in the streets were in high festival mood.

The joyous crowd swept him along and quickly separated him from his erstwhile guards. Curious, he began shouldering and thrusting his way through the throng. Suddenly wild cheering broke out, and people began squeezing their way out of the street to allow a large open limousine to inch through. Burleigh stared at it incredulously.

Two blank-faced enlisted men sat in the front seat, one of them driving. Standing in the back, a smiling, mild-faced old man accepted the cheers of the people, his arms outspread. Sitting at his left was a bemedaled general who also smiled and, from time to time, waved at the crowd. Sitting at his right was Pablo, also glorious in a general's uniform.

Pablo, nodding and occasionally waving to the shouting mass of free people, suddenly caught sight of the slack-jawed Burleigh, standing within a few feet of the triumphal limousine. Pablo allowed a knowing smile to blossom across his scarred face, and his right eye closed in an enormous wink.

And Burleigh found himself returning the wink. *If I ever lose my seat in Congress,* he thought, *I'll come down here and run for office. Down here we can always shake things up.* ■

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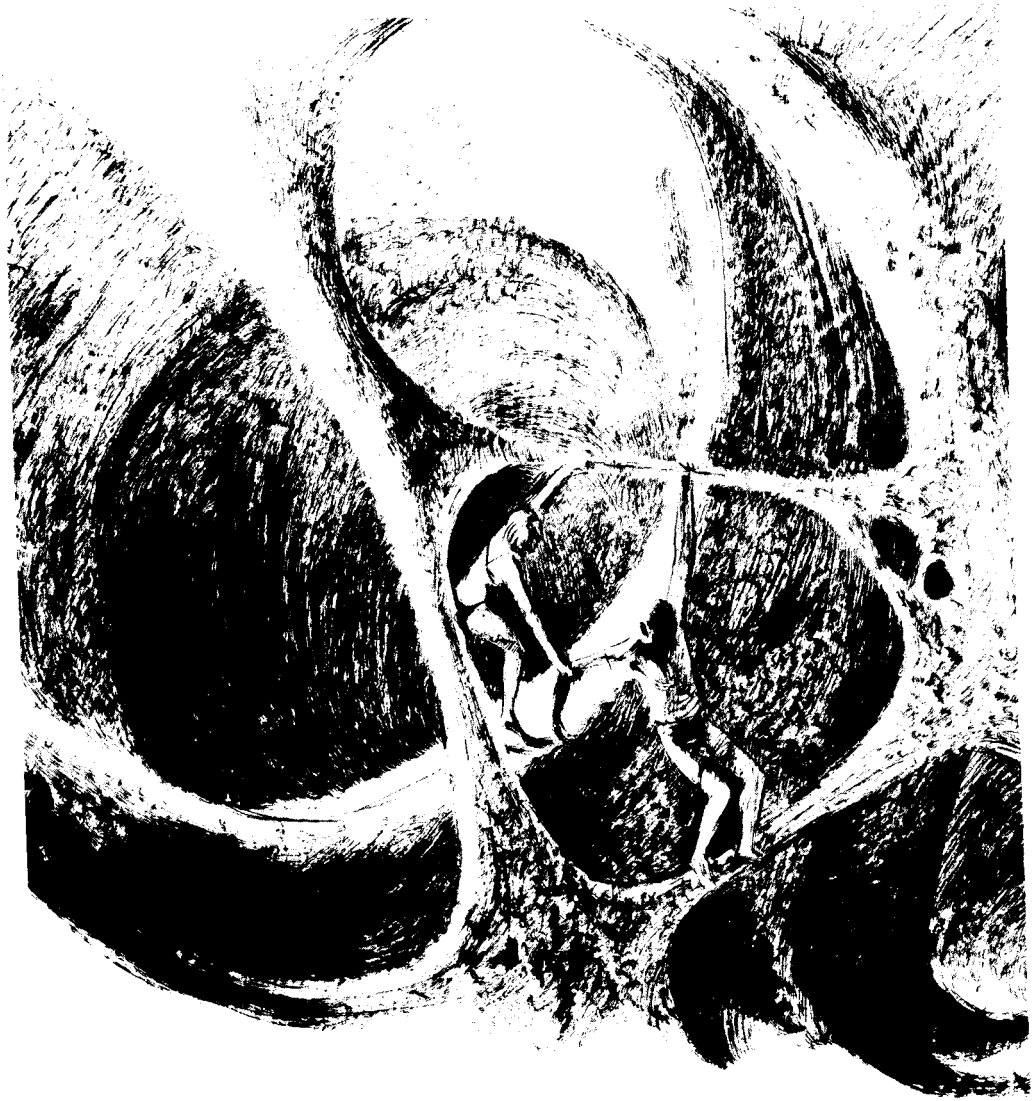

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JAMES SCHMITZ **THE TUVELA**

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Conclusion. As a friendly social visit to the float-island, Nile's visit flopped badly; the invading Parahuans were anything but friendly. But then—so was Nile! But the important thing in such an encounter is not what you think you are—but what the enemy thinks you are.

Illustrated by John Schoenherr

SYNOPSIS

Nandy-Cline is an ocean world displaying only one narrow continental land mass. Among its more unusual features are the floatwood islands—great buoyant forests drifting eternally with the sea currents about the planet. On one of these floatwood islands, Dr. Ticos Cay, a Federation scientist working for the Giard Pharmaceuticals company, is captured in his isolated research station by the high command of a secret invading force of alien Parahuans. The Parahuans are an amphibious species who made an attempt to occupy Nandy-Cline and drive out its human settlers eighty years before. The attempt ended in a decisive defeat for the Parahuans. They suffered heavy losses and were forced to retreat to their distant worlds.

The ruling caste of the Parahuans, which refers to itself as the Everliving, has evolved a form of individual immortality which includes a gradual shrinking of physical structure. They regard the human species as basically inferior to their own; and in an attempt to explain their defeat, they have developed what they call the Tuvela Theory. The Tuvelas were a semi-legendary human strain of some enturies past, renowned as military geniuses. The Everliving reason that Tuvelas still exist and are now the secret rulers of the Federation. It is argued that a second, more carefully prepared and executed invasion of Nandy-Cline, which takes the opposition of Tuvelas into consideration, will be successful. The Everliving who favor this approach form a group known as the Voice of Action. They are opposed by a group called the Voice of Caution which would prefer to avoid another hostile confrontation with the human species but which so far has

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been overruled by the majority of the Everliving.

Dr. Cay impresses his captors both because he is engaged in lon gevity research and has made a number of significant discoveries in it and by the fact that a form of mind training he has practiced enables him to withstand their nerve-torture devices. They regard him as an important prisoner who can provide them with valuable information and set up a laboratory in a concealed stronghold on the floatwood island, where he is to continue his research under their supervision. Here Dr. Cay learns about the Tuvela Theory and decides to use it against the invaders.

He is increasingly concerned about the safety of Dr. Nile Etland, a former student of his who is now laboratory head of the Giard Pharmaceuticals Station on the mainland. Nile presently will be coming out to the floatwood island on one of her periodic visits, and there is no way he can warn her off. If he does nothing, the Parahuans will kill her on her arrival. To prevent this, he indicates to them that she is one of the Tuvelas whose existence they have theorized—a member of the Federation's secret rulers called the Guardians. This makes them determined to capture Nile alive and test her for Tuvela abilities. If they can prove a Guardian is inferior to the Everliving, they can go ahead with the planned conquest of Nandy-Cline.

Nile sets out on schedule from the mainland in an aircar, accompanied by Sweeting, one of her two mutant otters. She is looking for a reported large floatwood drift, which might include the island where Dr. Cay is established, and attributes her inability to get into communicator contact with him to the serious seasonal interferences produced by Nandy-Cline's sun. Heavy typhoon weather hampers her search; and she turns for information to a group of sledmen, an independent and reserved breed of people whose permanent home is the planetary ocean and who have no more dealings with the mainland population than they can help.

Nile learns that the sledmen have designated the floatwood islands "gromgorru" that season. The term means something like the presence of malignant—possibly magical—unknown powers which must be avoided. Many sledmen have vanished lately while harvesting in the floatwood or simply when venturing too close to one of the islands. Nile reasons that the problem is due to some human criminal syndicate which has discovered a new biochemical treasure in the islands and wants to keep intruders frightened away while it completes its haul.

This is not a novel situation on Nandy-Cline, and she and Danrich Parrol, the manager of the Giard Station, have acquired a reputation for handling such criminals. She extracts a promise from the sledmen

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to get word through the communication interferences to Parrol for her, asking him to come out and help her get Dr. Cay off his island. Then she sets out again for the drift the sledmen have told her is south of her present position.

On her arrival, her aircar is brought down promptly to the island by a Parahuan weapon of unknown type. Nile, thoroughly familiar with the ways of surviving in the floatwood forests since childhood, eludes immediate capture with Sweeting. She sets the otter to scouting the waters to find out more about the situation, and makes her way alone to Dr. Cay's hidden station, where she encounters one of the leaders of the Everliving, the Great Palach Koll. She stuns him, takes him along as a prisoner, and locates a set of reports Dr. Cay has prepared for her, which tell her in detail about the Parahuan invasion, the Tuvela Theory, and the role of Tuvela-Guardian he has assigned to her to keep her from being killed out of hand. Nile realizes she may be able to use the role to convince the Everliving they should abandon their plans and tries it out on her captive. She is too successful—Koll, believing that she is a Guardian and may in fact be able to persuade the Everliving to retreat from Nandy-Cline, attempts to kill her and is killed himself.

Sweeting meanwhile has encountered two wild mutant otters who agree to help her and Nile against the Parahuans. The wild otters have seen no sign of Dr. Cay but tell Nile about the Parahuan stronghold in an adjoining forest section. Nile wants to reach that section in any case, in order to set fire to an oilwood stand after nightfall, which will serve as a beacon to tell Danrich Parrol where she is when he arrives. She, Sweeting, and their new allies, prepare to cross the dangerous stretch of open sea between the forests.

Part 2

A few minutes later the three otters slipped down into a lifting wave and were gone. Nile glanced about once more before following. A narrow sun-rim still clung to the horizon. Overhead the sky was clear—pale blue with ghostly cluster light shining whitely through. High-riding cloud banks to the south reflected magenta sun glow. Wind force was moderate. Here in the lee of the forest she didn't feel much of it. The open stretch of sea ahead was broken and foaming, but she'd be moving below the commotion.

In these latitudes the Meral produced its own surface illumination. She saw occasional gleams flash and disappear among the tossing waves —colonies of light organisms responding to the darkening air. But they wouldn't give enough light to guide her across. Time to shift to her night eyes . . .

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She brought a pack of dark-lenses from the pouch, fitted two under her lids, blinked them into position. A gel, adjusting itself automatically to varying conditions for optimum human vision—an experimental Giard product, and a very good one.

She pulled the breather over her face, fitted the audio plugs to her ears, and flicked herself off the floatwood. Sea shadow closed about her, cleared in seconds to amber half-light as the dark-lenses went into action. Fifteen feet down, Nile turned and stroked into open water.

Open but not empty. A moving weed thicket ahead and to the right . . . Nile circled about it, a school of small skilts darting past, brushing her legs with tiny hard flicks. She brought her left wrist briefly before her eyes, checked the small compass she'd fastened to it, making sure of her direction. The otters weren't in view. If the crossing was uneventful, she shouldn't see much of them. They were to stay about a hundred feet away, one of the wild pair on either side, Sweeting taking the point, to provide early warning of approaching danger.

A cloud of light appeared presently ahead; others grew dimly visible beyond it . . . pink, green, orange. The Shining Sea was the name the sledmen gave the Meral as it rolled here down the southern curve of the globe towards the pole. Nile began to pass thickets in which the light-bearers clustered. Each species produced its own precise shade of water-fire. None were large; the giants among them might be half the length of her forearm, narrow worm bodies. But their swarms turned acres of the subsurface to flame.

The fins moved her on steadily. She listened to the sea through the audios, sensed its changing vibrations against her skin. Amber dimness of open water for a while; then she went turning and twisting through a soggy dark forest of weed. Beyond it, light glowed again. She avoided the brightest areas—too easy to be spotted there.

Sweeting came to her once, circled about, was gone, a flicking shadow. Not an alarm report; the otter had checked on her position.

Then there was a sound which momentarily overrode the myriad other sounds of the Meral—a deep, distant booming. Half a minute later it was repeated. Closer now.

Nile held her course but moved towards the surface, scanning the areas below and ahead of her. The giant sea-havals were hunting. An encounter with one of the great creatures in the open sea ordinarily brought no risk to a human swimmer or, in fact, to anything but a sizable skilt. Sea-havals hunted by scent and sight; and skilts were their only prey. But when they made *that* sound, they were driving a major school. To avoid accidents, it was best to keep well out of the way of such a school—

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If possible, Nile added mentally.

And there came the first indications of trouble!

A dozen big torpedo shapes hurtled towards her, coming from a line of light-thickets ahead. Skilts—approximately in the three hundred pound class. Preferred size for a sea-haval.

Nile checked, moved quickly to the side, lifted farther towards the surface . . . near enough to feel the tugging surge of the swells—

The sea boomed like the stroke of a tremendous bell.

And the string of light-thickets exploded as the van of the skilt school bulleted through them—coming at her in a straight line. They were harmless creatures in themselves, but their panic, speed and weight made them deadly now. The impact of any of them would break her body apart. And the sea seemed an onrushing mass of thousands.

The scene was blotted from Nile's vision as she broke the surface. She rolled herself into a tight ball. There was nothing else she could do. A great wave lifted her. Then came a vast, thudding sensation from below, streaming past, a racing river which threatened to drag her down. Skilts exploded from the sea in frantic thirty-foot leaps all about, came smashing back to the surface. Then two final tremendous surges of the water beneath her. A pair of sea-havals had gone past.

Sweeting was there an instant later. The wild otters arrived almost as promptly.

"Nile here, heh? Fun, heh?"

Nile had no comment. She'd pulled off the breather, was gulping long lungfuls of storm air. Dim and remote, more sensed by her nerves than heard, came an echo of the sea-havals' booming. The hunt had moved on.

Moments later, she and the otters were underway again. For the next two hundred yards, weed beds were ripped and shredded by the passage of the fleeing school. Cleanly sectioned skilts, chopped by the big kesters, drifted about. Then things began to look normal . . .

Suddenly Sweeting was back, moving past Nile's face in a swirl of water, dropping a dozen feet, checking to turn, turning again and gliding towards a great limp tangle of weeds below her. Nile followed instantly in a spurt of speed. *"Come fast!"* was what that had meant.

She slipped into the rubbery slickness of the thicket. The otter was there, waiting. Far enough, apparently . . . Nile turned, took out the UW, parted the weeds enough to see anything coming towards her. When she glanced aside again, Sweeting was gone.

She waited. A light-thicket hung twenty yards to her left; about her was dimness. Small skilt shadows slipped past, and something big and chunky drifted up, turning slowly head-on as it came opposite her to

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stare in at her among the weeds. It paused, moved off. A large weed skilt, perhaps three times the weight of the maddened projectiles which had made up the school. A carrion eater by preference. It should do well in the wake of the sea-havals' hunt tonight—

Abrupt violent commotion—swirling of water, lifting and sinking of the weed fronds, thudding sensations which suddenly stopped . . . Nile knew the pattern of an underwater death fight; and this had been one, not many yards away. It was over now. She slipped forwards, gun held out, peering up. Dark smoky veils floated down and something bulky came settling through then, grazing the weed tangle. The Parahuan's head seemed nearly detached from the squat body, blood pumping out through the throat gashes. Typical otter work.

Sweeting reappeared from above. Together they hauled the unwieldy thing by its harness straps into the weeds. Fastened to the broad back was the Parahuan version of a jet rig. Nile studied it a moment, gave up the notion of converting the device to her own use; she would lose more time over that than it should take her to get back into the floatwood. They left the big rubbery body wedged in the center of the tangle. As they turned away, the first scavenging weed skilt was nosing towards it from the other side.

A hissing had begun in the audio pickup and was growing louder. Nile halted Sweeting in the trailing fringes of the thicket. Then two other bulky figures were slanting down swiftly through open water towards them, trailed by thin jet tracks. The Parahuans' guns were in their hands. Possibly they had picked up traces of the brief commotion and were looking for their dead companion. At any rate, they were hardly twenty-five feet away when Nile saw them, and their faces were turned towards her, semicircular water eyes staring. The UW couldn't miss on such targets, and didn't.

The immediate vicinity of a seahaval rookery at night was not for the nervous. Monstrous rumblings and splashings came from within the floatwood walls surrounding it, as the adult kesters left the rookery by a diving hole hacked through the forest's subsurface root floor, returned presently, beak-spears holding up to a ton of mangled skilts, to be greeted by the roars of their gigantic young.

Upwind of the racket, on the lagoon side, Nile finished recoating herself and her equipment with buti sap. She was down among the massive boles near the water, waiting for Sweeting to return and report. While they were dealing with three members of the Parahuan sea patrol, the wild otters had found and dispatched another three. That

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seemed to have left no survivors. But the patrol should have been missed by now; and what she did next would depend at least in part on what the Parahuans were doing as a result.

The tarm had been found still at its station beneath the blockhouse. Nile was thankful for that. The sudden near-encounter in the other forest with the pallid sea thing had rammed fear deep into her nerves; the thought of it hadn't been far from her mind since. The early reports that the Parahuans might have developed the monsters out of their own kind somehow made the tarm more horrible. After seeing what their biological skills had done in creating the form of a Great Palach, Nile thought it was possible. She told herself the buti and reasonable caution would keep the creature from noticing her if she met it again, but she wasn't at all sure of that. And the buti would be no protection if it came near her in the water.

Her wild allies might presently free her of that particular fear. They'd gone to get a supply of the poisoned thorns and seemed confident that in the underwater tangle of floatwood beneath the blockhouse they could plant a lethal dose into the tarm's huge body without too much trouble. Sweeting was prowling the lagoon, looking for signs of alien activity there or in the forest near Nile.

"Found Tikkos, Nile!"

"Where?"

Sweeting slipped up along the bough out of the lagoon, crouched beside her. "In boat," she said. "With little waddle-feet."

"*Little* waddle-feet?" Palachs?

"Half-size," said Sweeting. "Five, six. Tikkos talking to Guardian Etland. Then waddle-feet talking to Guardian Etland. Loud-voice. You Guardian Etland, heh?"

"The waddle-feet think so." Loud-voice was a loudspeaking device. "Let's get this straight! First, where's the boat Ticos and the waddle-feet are in?"

The otter's nose indicated the eastern end of the forest. "Boat's coming into lagoon. Coming this way. Got lights. Got loud-voice. Talking to forest. They think Guardian Etland's in forest. Tikkos say waddle-feet talk, not fight. You talk and maybe they go away. Waddle-feet say they sorry about fighting. No guns in boat. You come talk, please." Sweeting paused, watching her. "Kill them, get Tikkos now, heh?"

"No," Nile said. "No, we don't kill them. I'd better hear what they have to say. You say the boat's coming in this direction—"

"Coming slow. You don't listen to waddle-feet, Nile! Trick, heh? You come close, they kill you."

"It may not be a trick. Stay here."

But she felt shaky as she climbed quickly back into the forest towards the sea-haval rookery. The theoretical Tuvela, totally self-confident, certainly would be willing to talk to

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the aliens at this point, press the psychological advantage she'd gained. On the other hand, the Tuvela presumably would know what to do if it turned out she'd stepped into a Parahuan trap. Nile wasn't sure she would know what to do.

She caught her breath briefly as the wind backed up and assorted rookery stenches billowed around her. Far enough from the lagoon . . . She opened the pouch, took out the roll of tanglecord, added the otter caller to the other items, closed the pouch and shoved it into one of the fins, the buti stick into the other. She taped the fins together. They made a compact package which she wedged into a floatwood niche and secured further with tanglecord, leaving the roll stuck to the package. She was keeping the climb-belt and the UW.

She looked around a moment, memorizing the place, started back to the lagoon. Sweeting was hissing with alarm and disapproval when she got there. Nile calmed the otter, explained the situation as well as she could. The boat lights hadn't yet appeared around the curve of the forest to the east. They set off in that direction, Nile moving through the floatwood not far from the edge of the lagoon, Sweeting in the water slightly ahead of her. If a trap had been laid, they should spot it between them before they were in it. . . .

Going by Ticos' descriptions, the six Parahuans in the boat with him were Palachs. Concealed at a point some fifty feet above the water, Nile looked them over. Two were about his size; four ranged down from there, though none came near the midget level. In the boat lights they displayed odd headgears and elaborate harness arrangements . . . And, of course, they might be carrying concealed weapons.

She studied Ticos more carefully than his companions. There was a stiffness in the way he moved which showed he wasn't in good physical condition. But his amplified voice was clear; and if his phrasing had more than a suggestion of obsequiousness about it, that fitted the role he was playing—an inferior addressing the Guardian. A role of his own choosing: not one he had been forced to assume.

She was convinced that so far there was no trap. But there were other considerations . . .

The loudspeaker began booming about her again. It was set to penetrate high and deep into the forest, overriding the surging winds, to reach the attention of the Guardian Etland wherever she might be. Ticos and one of the Palachs used it alternately. The others squatted about the boat as it moved slowly through the lagoon along the forest.

The message was repetitious. She'd been listening to it for the past few minutes, keeping pace with the boat. Her talk with the Great Palach Koll had been monitored by the

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Everliving. The transmitting device presumably had been another of the jewels fixed to Koll's head; and the idea might have been Koll's—to let the other Great Palachs and Palachs follow his interrogation of the captured human, witness the collapse of her pretensions as Guardian and Tuvela. If so, the plan had backfired. Everything said, the fact that Koll was the prisoner, the Tuvela's evident knowledge of Porad Anz's secrets, was designed to further undermine the Everliving's confidence. It explained Koll's sudden furious attack. He felt she had to be silenced then and there to preserve the goals of the Voice of Action.

Nile gathered that the ranks of the Everliving had been in turmoil since. The loss of the sea patrol did nothing to calm them. They didn't suspect she had nonhuman assistants, so it appeared to them that the patrol had encountered the Tuvela on her way over from the other forest and that she'd wiped it out single-handedly before it could get out an alarm. Then a short while ago they'd begun getting reports that a small fast surface vessel was maneuvering elusively about the drift—the Sotira sleds had kept their promise to provide her with a message courier. The Everliving naturally associated the presence of the ship with that of the Tuvela. But they didn't know what its purpose was . . .

They'd been under psychological pressure since she'd first avoided what had seemed inevitable capture. With each move she'd made thereafter the pressure increased. That the moves were forced on her they didn't realize. All of it would seem part of the Tuvela's developing plan . . . a plan they didn't understand and seemed unable to check. They didn't know to what it would lead. Fears they'd nourished and fought down for over half a century fed heavily on them again.

So they, the proud Palachs of Porad Anz, had sent out Dr. Ticos Cay and a delegation of the Voice of Caution to offer the Tuvela a cessation of hostilities and the opportunity to present the Guardians' terms to them in person. No doubt some of Koll's adherents remained ragingly opposed to the move.

Could she risk talking to them?

As things stood, she had a very good chance of getting away from here presently. Then she could warn her kind that there was an enemy among them and that they must prepare for attack. If she walked into the enemy's camp and couldn't maintain the Tuvela bluff, she'd have thrown away the chance. If Ticos had understood that, he mightn't be urging her now to reveal herself.

But if she didn't respond and remained concealed, the pressure on the Everliving wouldn't let down. They'd interpret silence to mean that they were no longer being offered an opportunity to withdraw.

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How would they react? They might feel it was too late to attempt retreat. They'd had many weeks to prepare the strike against Nandy-Cline from their hidden floatwood bases. If they decided to launch it before countermoves began, how long would it be before space weapons lashed out at the mainland? Hours? Her warning would come too late in that case . . .

The real question might be whether she could risk *not* talking to them.

Abruptly, Nile made up her mind.

The Parahuan boat came slowly about the curve of the forest. The loudspeaker began to shout again. After a few words it stopped. The Palach Moga, standing beside Ticos Cay, lowered the instrument carefully and turned it off with an air of preferring to make no sudden moves. There was a burst of sibilant whisperings behind Ticos. They ceased. The boat's engines cut out and it drifted up against a tangle of lagoon weeds. The man and the six aliens stared at the motionless figure standing at the forest's edge ten yards away.

The Tuvela's voice said crisply, "Dr. Cay!"

Ticos cleared his throat. "Yes, Guardian?"

"Have that craft brought over here and introduce the Parahuan officers to me—"

Stepping down into the boat was like crossing the threshold of a grotesque dream. They stood erect on long legs, abandoning the natural posture of their kind, balanced not too certainly on broad feet. Parahuan heads inclined in obeisance to the Guardian as Ticos introduced them in turn. She knew the names of the Palach Moga and one of the others from his report. Along with half a dozen Great Palachs, Moga was the most influential member of the Voice of Caution. He retained his place beside Ticos. The others stood well to the back of the boat as it turned out again into the lagoon.

Moga spoke briefly into a communicator, said to Nile, "The Everliving are assembling to hear the Guardian . . ."

She didn't ask where they were assembling. A Tuvela would show no concern for such details. An angry whistling came for an instant from farther out in the lagoon. Sweeting still didn't approve of this move.

The sound seemed to jar all along Nile's nerves. She was frightened; and knowing that now of all times she couldn't afford to be frightened simply was making it that much worse. For moments her thoughts became a shifting blur of anxieties. She tried to force them back to what she would say to the Everliving, to anticipate questions to which she must have answers. It didn't work too well. But the physical reactions faded gradually again.

Stocky Oganoon figures, weap-

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ons formally displayed, lined the sides of the water-level entrance to the blockhouse. The boat moved a few yards along a tunnel, was moored to a platform. She followed Moga up into the structure. Ticos stayed a dozen steps behind, effacing himself, playing his own role. After the introductions, she hadn't spoken to him. On the next level, she realized he was no longer following.

The Palach Moga paused before a closed door.

"If the Guardian will graciously wait here, I will see that the Assembly is prepared . . ."

Nile waited. After moments the door reopened and the Palach emerged. He carried something like a jeweled handbag slung by a long strap over one shoulder. Nile had the impression he was ill at ease.

"If the Guardian permits . . . There are Great Palachs beyond this door. They are unarmed. They would prefer it if the Guardian did not address them with a weapon at her hand."

If she couldn't convince them, Nile thought, she would die behind the door. But a Tuvela would not need to draw courage from a gun at this stage—and the UW by itself was not going to get her back past the clusters of guards in the passages behind them. She unclipped the holster from her belt, held it out. Moga placed it carefully in the bag and drew open the door. Nile went inside.

For a moment she had the impression of being in the anteroom to a great, dimly lit hall—too large a hall by far to be part of this structure in the floatwood. Then she knew that the whole opposite wall of the room was a viewscreen. There were upward of a dozen Great Palachs in the room with her, squatting along the wall to either side . . . creatures not much larger than Koll, in richly colored stiff robes and an assortment of equally colorful hats. The remainder of the Everliving, Palachs and Great Palachs of all degrees, were arranged in rows along the hall, which must be a section of the headquarters ship below the sea. Shallow water shifted and gleamed here and there among the rows. Motionless and silent, the massed amphibians stared up at her from the dimness.

Nile heard the door through which she had come close quietly at her back. And curiously, with the tiny click her uncertainties were gone. A cool light clarity seemed to settle on her mind, every thought and emotion falling into place . . . She discovered she had moved forward and was standing in the center of the chamber, facing the screen.

Selecting her words with chilled precision, the Tuvela began to speak.

VII

The outstanding feature of the big room in the blockhouse struc-

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ture the Parahuans had assigned Ticos Cay as his working laboratory was its collection of living specimens. The floatwood island's life forms lined three of the walls and filled long shelf stands in between. Neatly labeled and charted, they perched on or clung to their original chunks of floatwood, stood rooted in the pockets of forest mold or in victimized life forms in which they had been found, floated in lagoon water, clustered under transparent domes. They varied from the microscopic to inhis organisms with a thirty-foot spread. For the most part, they were in biological stasis —metabolism retarded by a factor of several million, balance maintained by enzyme control and a variety of other checks. Proper handling would otherwise have been impossible.

The Guardian was able to find little fault with the progress Dr. Cay had made in his work projects. "In this respect you have not done badly," she acknowledged, for the benefit of whatever ears might be listening. She tapped the charts he'd offered for her inspection together and dropped them into the file from which he'd taken them. "It's disappointing, however, that it became necessary at last for me to intervene directly in a matter we had expected you to handle alone."

"Given more time, I might have done it!" Ticos remonstrated humbly. "I was opposed by a number of intractable beings, as you know."

"I do know—having encountered one of those beings. But it was hardly a question of time. The issues were clear. If they had been presented with clarity, a rational majority of our uninvited guests would have drawn the correct conclusions and acted on them. We must count this a failure. You needn't let it concern you unduly. The excellent thoroughness of your work on the basic assignment, under somewhat limiting conditions, will offset the failure, at least in part."

Ticos mumbled his gratitude, went back with evident relief to additional explanations about his projects. Nile checked her watch.

Forty-two minutes since she'd been escorted with careful courtesy from the assembly chamber to the lab and left there with Ticos. No word from the Everliving since then, and the Palach Moga hadn't showed up with her gun. Good sign or bad? While she was talking to them, she'd almost *been* a Tuvela. She'd blasted them! She'd felt exalted. There'd been no questions. The Great Palachs closest to her in the chamber had edged farther back to the walls before she was done, stirred nervously again whenever she shifted a glance in their direction.

Afterwards, brief sharp letdown. No Tuvela, no Guardian. Simply a scared human in a potentially very bad spot, with much too much at stake. If she'd fumbled this in any way, made the slightest slip—

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Now she was somewhere between those states, back to normal, worried enough but again busily balancing possibilities, planning as much as could be planned here.

One of the factors she'd been considering was this room itself. It was long, wide, high, located somewhere near the top of the overall structure—she'd come up another level after leaving the chamber. It had a door at either end, probably locked now. The last could make no real difference since there was bound to be a gaggle of armed Oganoon outside each door to make sure the Guardian and her scientist didn't walk out on the conference. From the door at the left a raised walkway led to a platform some four feet above the floor near the center of the room. The Palachs, Ticos had explained, customarily stood there when they'd come to have dealings with him.

Lighting came from conductor rods in ceiling and walls, primitive but efficient. Ventilation arrangements, while equally simple, met the lab's requirements perfectly. There was a large shadowy rectangle enclosed in a grid up on one of the walls just below the ceiling. Behind the grid was an unseen window, a rectangular opening in the wall. The salty-moist many-scented freshness of the floatwood forest swirled constantly about them. Enclosed without it, many of Ticos's research specimens would have died in days. But the storm gusts which occasionally set the blockhouse structure quivering were damped out at the window, and almost no sound came through.

So the shadowy rectangle was a forcescreen. It would let out no light, and certainly it was impenetrable to solid objects such as a human body. The screen controls must be outside the room, or Ticos would have indicated them to her. But there was a knobby protrusion on either side of the grid which enclosed the rectangle. And beneath those protrusions were the screen generators—

Which brought up the matter of tools, and weapons or items which could serve as weapons. Her UW would be hard to replace in either capacity. But one could make do. Ticos had left a small cutter-sealer on the central worktable back of them. A useful all-around gadget, and one that could turn into a factor here. Another potential factor was the instrument studded with closely packed rows of tiny pushbuttons, which Ticos carried attached to his belt and through which he regulated various internal balances and individual environmental requirements of his specimens.

The only obvious weapons around were the guns in the hands of three Parahuan guards who squatted stolidly in two feet of water in the partitioned end of the room at the right. From the platform, Nile had looked in briefly across the di-

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viding wall at them. Two were faced towards the wall; one was faced away towards a long table near the second exit. None of them moved while she studied them. But they looked ready to act instantly. The guns appeared to be heavy-duty short-range blasters, made to be used by hands four times larger than hers. On the table stood Ticos Cay's communicator.

The guns weren't factors, except as they could become negative ones. But with a Sotira racing sled moving within close-contact band reach, the communicator was a very large factor. The Everliving in their nervous ambivalence had decreed it should be available at a moment's notice in case they were forced to open emergency negotiations with the Tuvelas through Dr. Cay. The guards were there to blast death into anybody who attempted to use it under any other circumstances.

Ticos Cay himself was, of course, an important factor. Physically he could become a heavy liability if matters didn't develop well. He'd lost his wiry bounciness; he was a damaged old man. His face looked drawn tight even when he smiled. He'd been holding pain out of his awareness for weeks; but as an organism he'd been afflicted with almost intolerable strains and begun to drift down towards death. Of course he knew it.

Mentally he didn't seem much impaired. His verbal responses might be a trifle slowed but not significantly. Nile thought she still could depend on him for quick and accurate reaction, as she might have to do. Because the final factor in the calculation here was Ticos Cay's collection of floatwood life. On the worktable, next to the cutter-sealer she'd mentally earmarked, lay several objects like hard-shelled wrinkled gray fruits, twice the size of her fist. Ticos had taken them out of a container to explain the purpose they were to serve in his research, left them lying there.

They were called wriggler apples and the shells showed they had ripened. The thing to know about ripe wriggler apples was that they remained quiescent until they received the specific environmental stimulus of contact with salt water. At that moment they split open. And the wrigglers came out . . .

At best, the apples were a dubious research item. And they were not at all the only specimens in that category here. At a rough estimate, one in fifty of the life forms which cluttered the shelf stands and walls had caused Nile to flinch inwardly at first glimpse or whiff of identifying odor. Floatwood stuff she'd been conditioned against almost since she was big enough to walk. It wasn't all small or unobtrusive. Dominating the center of the room was a great purple-leafed inhis, the pale blue petals of its pseudoflowers tightly furled. A rarity, to no one's regret. In the forests, Nile wouldn't have come willingly within thirty

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feet of one. By classification it was a plant form. A vegetable, with lightning reactions. The sledmen, with good reason, had named it the Harpooneer. For some weeks it had loomed above and just behind the Palachs who had come and squatted on the platform, staring down at the human prisoner . . .

It was dormant now, as were most of the other unreliable specimens—totally innocuous, metabolism slowed to a timeless pulse. In biological stasis. It would remain innocuous until it was given the precise measured stimulus, massive enzyme jolt or whatever, that broke the stasis.

And who could produce such stimuli? Why, to be sure, Dr. Cay with his pushbutton control device. He'd made certain that when it came time to die, he should have the means of taking some of the enemy with him.

Which might not be a detached scientific attitude but was certainly a very human one . . .

Nile flicked another glance at her watch. Forty-three and a half minutes.

The door at the left clanged open.

The Palach Moga came first along the walkway. The bag into which the UW had disappeared swayed at his side, its strap slung over his shoulder. That detail might have been reassuring if the group behind him had looked less like an execution squad.

Nile stood with her back to the worktable, feeling tensions surge up and trying to show nothing. Ticos gave her an uncertain, questioning look, then turned and moved off slowly along the table, stopping a dozen feet away to watch the Parahuans. The fingers of his right hand fiddled absently with the control device. Moga was approaching the control platform in his grotesquely dainty upright walk, webbed feet placed carefully for each step. Two Oganoon guards came behind him, staring at Nile, massive short-barreled guns held ready for action. Two unfamiliar Palachs followed, moving in an uncompromising Parahuan waddle. Their strap harnesses were an identical crimson; and each carried two sizable handweapons, one on either side, grips turned forward. Another pair of guards concluded the procession. These had their guns slung across their backs and held items like folded black nets. A fifth guard had stopped inside the door, which had closed again after the party passed through. He had another kind of gun with a long narrow barrel, attached to a chunky tripod. He set the tripod down with a thump on the walkway, squatted behind it. The gun muzzle swung around and pointed at Nile.

She didn't move. She'd given them some reason not to trust her.

The group reached the platform, spread out. Moga stood near the platform's edge. The red-harnessed

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Palachs flanked him, hands clamped on their gun grips. The guards with the guns took up positions to either side of the Palachs. The guards with the black nets remained a little to the rear, at the left side of the platform. There were, Nile thought, indications of as much nervous tenseness as she was able to make out in a Parahuan visage—silently writhing speech slits, blinking atmosphere eyes. And all eyes were fixed on her, on the Tuvela. Nobody looked at Ticos Cay.

"Guardian, I shall speak first for myself," Moga's voice said suddenly.

Nile didn't answer. The voice resumed. "I am in great fear for Porad Anz . . . When you agreed to address the Everliving, I was certain that your mission would succeed and that the balance would shift to reason. And the response of the Assembly was strongly favorable. Your logic was persuasive. But there has been an unforseen development. By violence the Voice of Action has assumed control of our forces. It is against all custom, an unprecedented Violation of Rules—but that appears to be no longer important. Here, on the Command Ship and elsewhere on this world, many Great Palachs and Palachs lie dead. Those who survive have submitted to the Voice of Action which now alone speaks for the Everliving. I have come to inform you of what has been decreed. And having spoken for myself, I shall speak now with the words of the Voice of Action."

Silence.

The group on the platform remained tautly motionless. Nile watched them; they stared at her. So the red-harnessed Palachs represented the Voice of Action . . . The thought came suddenly that these must be very courageous creatures. They'd entered the laboratory to confront a legend. They were braving gromgorru. They waited now to see what the Tuvela might do in response to Moga's statement.

The Tuvela also stayed silent and motionless.

The Palach to Moga's right began speaking abruptly in a series of fluctuating Parahuan hootings, eyes fixed on Nile. After perhaps half a minute he stopped. Moga promptly began to translate.

"Whatever you call yourself, you are a Tuvela. We know this now. You have threatened Porad Anz in the name of your kind. That cannot be tolerated. You have told us that in any hostile encounter with the Guardians the Everliving must be defeated. Once and for all, that lie shall now be disproved . . ."

Moga's voice ended. The red-harnessed Palach spoke again. His fellow turned his head for an instant, addressed the two Oganoon holding the nets. The two took the nets from their arms, shook them out. Black straps dangled from their rims.

Moga took up the translation.

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"The Voice of Action offers you and Dr. Cay the death of Palachs. It is painful but honorable. If you accept, you will submit to being enclosed by the confinement nets. If you attempt to resist, you will be shot down and die here like Hulons. In either case, Tuvela, your defeat and death signal the beginning of the hour of our attack on your world. And now, if it is within the power of a Tuve'a to defy our purpose, show what you can do—"

Beyond the group, the Parahuan at the door sagged silently forward over the gun, head and upper body obscured by the curling green fog lifting from a specimen on the wall beside him. The armed guards on the platform had pointed their guns at Nile. The red-harnessed Palachs drew their weapons. A dozen or so of the Harpooneer's pseudoflowers behind the platform quivered and unfurled in a flick of motion like great yellow-blue eyes blinking open. Nile dropped flat.

There had been at least two guns aimed directly at her in that instant; and fast as the Harpooneer was, it might not be fast enough to keep the guns from going off.

They didn't go off. There were other sounds instead. Something landed with a thump on the floor not far away. With a brief shock of surprise her mind recorded the bag Moga had been carrying. She was coming back up on her feet by then, scooped two of the gray-shelled wriggler apples from the worktable, lobbed them across the partitioning wall into the flooded section of the room. She heard them splash. A detached part of her awareness began counting off seconds. She looked around.

They were dead up there, nervous systems frozen, unlidded double-lensed eyes staring hugely. Embedded in their backs were bone-white spikes, tipping the thick coiled tendrils extended from the pseudoflowers. Four still stood swaying, transfixed, long legs stretched out rigidly. Three had been lifted from the platform, were being drawn over to the Harpooneer. Nile upended Moga's bag, shook out the UW, had it clipped to her climb-belt as the part of her mind that was counting seconds reached thirty and stopped. There'd been a few violent splashings from beyond the partition, but she heard nothing now. Ticos, holding the control device in both hands, face taut and white, gave her a quick nod.

The climb-belt was at half-weight as she reached the partition wall. She jumped, clapped her hands to the top, went up and over.

Seven years before, she'd seen a wriggler swarm hit a human diver. It was largely a matter of how close one happened to be to the apple when it tumbled down out of the floatwood forest, struck salt water and split. In the same moment thousands of tiny writhing black lines spilled from it and flashed unerringly towards any sizable animal bodies

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in the immediate vicinity, striking like a cluster of needle drills, puncturing thick hide or horny scales in instants—

The three guards lay face down, partly submerged, in the water that covered the floor. Two were motionless. The third quivered steadily, something like a haze of black fur still extending along his torso below the surface. All three were paralyzed now, would be dead in minutes as the swarms spread through them, feeding as they went.

And the passage was safe for Nile. The wrigglers were committed.

She reached the stand with Ticos' communicator on it, flipped switches, turned dials, paused an instant to steady her breath.

"Sotira-Doncar!" she said into the speaker then. "Sotira-Doncar! *Parahuans here! Parahuans here!*" And cut off the communicator.

No time to wait for a reply. No time at all—

"Can you needle the stink-fogs into action?"

"Of course. But—"

"Hit them!" Nile drew the climb-belt tight around his waist, clipped the UW to the top of her trunks. "If we can get out, we'll be out before it hurts us."

Ticos glanced up at the force-screened window oblong, grunted dubiously. "Hope you're right!" His finger tapped a control. "They're hit. Now?"

Nile bent, placed her hands together. "Foot up! Try to keep your balance. You're minim-weight—you'll go up fast. Latch on to the grid and drop me the belt. I think I can make it to your ankles."

She put all her strength into the heave. He did go up fast, caught the grid and hooked an arm through it. The climb-belt floated back down. Greasy clouds boiled about the aroused stink-fogs near the entrance door on the left as Nile snatched the belt out of the air and fastened it around herself. Ticos was hanging by both hands now, legs stretched down. She sprang, sailed up along the wall, gripped his ankles and swarmed up him, the antigrav field again enclosing both of them. Moments later she'd worked her knees over a grid bar, had the belt back around Ticos. Breathing hard, he pulled himself up beside her and reached for the control device.

"Fogging up down there, all right!" he wheezed. "Can't see the door. Might alert a few more monsters, eh?"

"Any you can without killing us." Somebody outside the room *must* know by now that the execution plans had hit a snag. Clinging by knees and left hand, Nile placed the UW's muzzle against one of the grid casings that should have a force-screen generator beneath it, held the trigger down. The beam hissed and spat. The casing glowed, turned white. An incredible blending of stenches rose about her suddenly,

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closing her throat, bringing water to her eyes. She heard Ticos splutter and cough.

Then the casing gave. Something inside shattered and flared. Wind roared in above Nile.

"Up and out, Ticos! Screen's gone!" She hauled herself up, flung an arm across the ledge. Her shoulder tingled abruptly. Nerve charge! Parahuans in the lab . . . Below her, Ticos made a sound of distress. Straddling the ledge, she squinted down, saw him blurrily. He'd dropped the control gadget, was clinging to the grid with both hands, shaking in hard convulsions. Heart hammering, Nile reached for him, caught his arm, brought the low-weight body flopping over the ledge and into the growth outside the window. He grasped some branches, was steadying himself, as she turned back.

Half the lab below was obscured by stink-fog emissions, whirled about by the wind. There was an outburst of desperate hootings—one or more Parahuans had run into a specimen which wasn't bothered by smells. She had glimpses of bulky shapes milling about, blinded by the fog. They should also be half-strangled by it. But at least one of them had seen Ticos up here long enough to take aim with a nerve-gun.

The greasy mist swirled aside from a section of floor where four glassy containers stood on a low table. Nile had seen what was inside them when she came into the lab. The top of the nearest container splintered instantly now under the UW's beam. She shifted aim. The startled organism in the shattered container already was contracting and expanding energetically like a pump. A second container cracked. As Nile sighted on a third one, a Parahuan reeled out of the stink-fog cloud, swung a big gun up at the window.

She ducked back behind the ledge. No time for gun duels. And no need. Two of the containers were broken and she'd seen jets of pale vapor spurting from both. The specimens in them were called acid bombs, with good reason. Nobody in the lab at present was likely to leave it alive —and certainly no one coming in for a while was going to get out again in good enough condition to report that the captives had fled by way of the force-screen window.

She aimed along the room's ceiling to a point where the central lighting bars intersected. Something exploded there, and the lab was plunged into darkness.

Nile swung back from the window, the stink-fog's reek wafting about her. Ticos was leaning against branches, clinging to them, making abrupt jerking motions.

"How badly are you hit?" she asked quickly.

He grunted. "I don't know! I'm no weapons specialist. What *did* hit me? Something like a neural agitator?"

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"In that class. You didn't stop a full charge, or you wouldn't be on your feet. With the climb-belt, I can carry you. But if you can move—"

"I can move. I seem able to hold off some of the effects. If I don't slow you down too much."

"Let's try it out," Nile said. "They shouldn't be after us immediately. Let me know if it gets too difficult."

Her bundle was in the niche of floatwood where she'd left it. She opened it hastily. Ticos stood behind her, clinging to the vegetation, bent over and gasping for breath. Nile was winded enough herself. They'd scrambled straight up from the roof of the blockhouse into the forest, cut across south of the sea-haval rookery, clambered down again towards the lagoon. It hadn't been a lightweight dance along the branches for her this time. Her muscles knew they'd been working. Even so, Ticos, supported by the climb-belt, had been pushed very hard to keep up with her. He wasn't equipped with dark-lenses, wasn't sufficiently skilled in the use of the belt; and at intervals the nerve-gun charge he'd absorbed set off spasms of uncontrollable jerking and shaking. There were antidotes for the last, and no doubt the Parahuans had them. But there was nothing available here. He'd have to work it out. Another five or ten minutes of climbing might do it, Nile thought. It had better do it—she knew now Ticos had lost half his reserves of physical energy since she'd seen him last. If the effects of the alien weapon corresponded at all closely to those of its humanly produced counterparts, a more central charge should have killed him quickly. The load he'd stopped might still do it, though that seemed much less likely now.

She fished the pack of dark-lens gel from the pouch, handed it to him. "Better put on your night eyes."

"Huh? Oh! Thanks."

A series of shrill whistles rose from the lagoon. Ticos' head turned quickly.

"Sounded almost like one of your otters!"

"It was. Sweeting." Nile had heard intermittent whistling for the past several minutes, hadn't mentioned it. The wind still drowned out most other sounds. She pried the end of the buti stem open with her knife. "Got the lenses in place?"

"Yes."

"Then let's see how fast you can put on a coat of buti. We might have a problem here rather soon."

Ticos took the stem, began rubbing sap hurriedly over his clothes. "Parahuans?" he asked.

"Perhaps. Something seems to be coming this way along the lagoon. That was Sweeting's warning signal. Did you know your friends had a tarm here?"

"I've seen it." Ticos' tone held shock, but he didn't stop working. "You think that's what's—"

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"It's more likely to be the tarm than Parahuans."

"What can we do, Nile?"

"Buti seems to be good cover if it doesn't see us. The thing got close to me once before. If it comes this far, it probably will find our trail. I'll go see what Sweeting has to tell. You finish up with the buti. But don't smear the stuff on your shoe soles yet."

"Why not?"

"I think we can lose the tarm here. It may not be too healthy by now anyway."

He looked up briefly, made a sound that was almost a laugh.

"More Tuvela work?"

"This Tuvela has little helpers . . ." Nile switched on the otter-caller, moved quickly towards the lagoon. At the edge of the water she stood glancing about, listening. Nothing significant to be seen. The blurred snarling of engines came for a moment from the general direction of the blockhouse. Then Sweeting broke the surface below her.

"Nile, you watch out! Tarm coming!"

Nile rejoined Ticos moments later. The tarm was approaching through the floatwood above water level. It might be casting about for their trail, or might be on the move simply because it was beginning to feel the effects of the wild otters' weed poison. They'd succeeded in planting a considerable number of the thorns in it under the blockhouse. Sweeting reported its motions seemed sluggish. But for a while it could still be dangerous enough.

She postponed further explanations, and Ticos didn't press for any. They hurried down to the lagoon together. If the tarm didn't turn aside, it should come across their human trail. Then the lagoon must be where the trail seemed to end. If it began searching for them in the water, the otters would try to finish it off. Evidently the tarm didn't realize that the small elusive creatures might be dangerous to it. After it found it couldn't catch them, it hadn't paid them much attention.

They rubbed buti sap into the soles of their shoes, waves lapping a few feet below. Nile thought the last coating she'd given herself should be adequate otherwise. Her stock of the sap was running out; she might need some later and didn't know whether she could find another stand. By the time they finished, otter whistling had begun again, not far off. She led the way back into the forest, moving upward. Ticos crowded behind her, tarm fear overriding his fatigue. Perhaps a hundred feet on, Nile suddenly checked.

"Down, Ticos! Flatten out!"

She dropped beside him on the bough along which they had been moving. There was a disturbance in the forest below that wasn't caused by the wind. Vegetation thrashed

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heavily. The noise stopped for some seconds, then resumed. It seemed to be approaching the area they'd left. They watched, heads raised, motionless.

Then Nile saw the tarm for the third time. Ticos stiffened beside her. He'd detected it too.

Even with the dark-lenses she couldn't make out many details. There was growth between them. The great thing moving among the boles of the forest looked like a fat gliding worm. Its nearness had an almost numbing effect on her again. She stared at it in fixed fascination; and it was some moments then before she realized it had stopped—about at the point where they had gone down to the water, where the human scent lay and where it should end, blotted out by the buti.

They both started at an abrupt series of loud sucking noises. The pale mass seemed to swell, then flattened. It had turned, was flowing up into the forest.

"It—" Ticos began.

"Going back the way we came. It isn't following us."

He sighed with relief. They watched the tarm move out of sight. Long seconds passed. Finally Ticos looked over at Nile. She shook her head. Better not stir just yet.

And then the tarm reappeared, following the line of their trail back to the water's edge. Now it slid unhesitatingly down into the lagoon and sank below the surface. Otter whistles gave it greeting.

They got to their feet at once, hurried on. The wind noises had become allies, covering the sounds of their retreat. Nile selected the easiest routes—broad boughs, slanted trunks. Ticos simply wasn't up to much more; he stumbled, slipped, breathed in wheezing gasps. At last she stopped to let him rest.

"Huh?" he asked. "What's the delay?"

"We don't have to kill you at this stage," Nile told him. "They may not even know yet that we aren't lying dead in the laboratory. They've probably sealed the doors to keep half their fort from becoming contaminated."

He grunted. "If they haven't searched the lab yet, they soon will! They can get protective equipment there in a hurry. And someone should have thought of that window by now."

Nile shrugged. The tarm could chill her, but she was no longer too concerned about Parahuan trackers. "We have a good head start," she said. "If they trail us to the lagoon, they won't know where to look next. We could be anywhere on the island." She hesitated. "If they have any sense left, they won't waste any more time with us at all. They'll just get their strike against the mainland rolling. That's what I'm afraid they'll do."

Ticos made a giggling sound. "That's the one thing they can't do now! Not for a while."

"Why not?"

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"It's the way their minds work. The only justification the Voice of Action had for what it's done was the fact that it could deliver your head. Proof of the argument—Tuvelas can be destroyed! They've lost the proof and they'll be debating for hours again before they're up to making another move. Except, of course, to look for you. They'll be doing that, and doing it intensively. We'd better not wait around. They might get lucky. How far is it still to the incubator?"

Nile calculated. "Not much more than four hundred yards. But it includes some pretty stiff scrambling."

"Let's scramble," Ticos said. "I'll last that far."

VIII

The incubator was a loosely organized colony-animal which looked like a globular deformity of the floatwood bough about which it grew. The outer surface of the globe was a spiky hedge. Inside was a rounded hollow thirty feet in diameter, containing seed pods and other vital parts, sketchily interconnected. The hedge's spikes varied from finger-long spines to three-foot daggers, mounted on individually mobile branches. Only two creatures big and powerful enough to be a potential threat to the incubator's internal sections were known to have found a way of penetrating the hedge. One of them was man.

The other was no enemy. It was a flying kester, a bony animal with a sixteen-foot wingspread, at home among the ice floes of the south, which maintained a mutually beneficial relationship with the incubator organism. Periodically it flew northwards to meet floatwood islands coming along the Meral, sought out the incubators installed on them, left one of its leathery eggs in a seed pod on each, finally returned to its cold skies. In the process it had distributed the incubators' fertilizing pollen among the colonies, thereby carrying out its part of the instinctual bargain. When the young kester hatched, the seed pod produced a sap to nourish the future pollinator until it left its foster parent and took to the air.

Man's energy weapons could get him undamaged through the hedge. The simpler way was to pretend to be a polar kester.

"It's right behind these bushes," Nile said. She indicated a section of the guard hedge curving away above the shrubbery before them. "Don't get much closer to it."

"I don't intend to!" Ticos assured her. Their approach had set off a furious rattling as of many dry bones being beaten together. The incubator was agitating its armament in warning. He stood back watching as Nile finished trimming a ten-foot springy stalk she'd selected to gain them passage through the hedge. Another trick learned in childhood—the shallows settlers considered incubator seeds and po-

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lar kester eggs gourmet items. Spiky fronds at the tip of the stalk were a reasonable facsimile of the spines on the kester's bony wing-elbow. Confronted by an incubator's challenge, the kester would brush its elbow back and forth along one of the waving hedge branches. A number of such strokes identified the visitor and admitted it to the globe's interior.

Nile moved up to the shrubs standing across their path on the floatwood bough, parted them cautiously. The rattling grew louder and something slashed heavily at the far side of the shrubs. She thrust out the stalk, touched the fronds to an incubator branch, stroked it lightly. After some seconds the branch stiffened into immobility. Moments later, so did the branches immediately about it. The rattling gradually died away. Nile continued the stroking motion. Suddenly the branches opposite her folded back, leaving an opening some five feet high and three wide.

They slipped through, close together. Nile turned, tapped the interior of the hedge with the stalk. The opening closed again.

Unaided human eyes would have recorded blackness here. The dark-lenses still showed them as much as they needed to see. "Over there," Nile said, nodding.

The interior of the colony-animal was compartmentalized by sheets of oily tissue, crisscrossed by webbings of fibrous cables. In a compartment on their left were seven of the big gourd-shaped seed pods. The caps of all but two stood tilted upwards, indicating they contained neither fertilized seeds nor an infant kester.

"We settle down in those?" It was Ticos' first experience inside an incubator.

"You do," Nile said. "They're clean and comfortable if you don't mind being dusted with pollen a bit. The whole incubator has built-in small-vermin repellents. We could camp here indefinitely."

"It doesn't object to being tramped around in?"

"If it's aware of being tramped around in, it presumably thinks there's a kester present. Go ahead!"

He grunted, gripped one of the cables, stepped off the bough to another cable and swayed over to the nearest pod. Nile came behind, waited while he scrambled up the pod, twisted about, let himself down inside and found footing. "Roomy enough," he acknowledged, looking over the edge at her. He wiped sweat from his face, sighed. "Here, let me give you back your belt."

"Thanks." Nile fastened the climb-belt about her. "Where's yours, by the way?"

"Hid it out in my quarters when I saw the raiding party come up. Thought I might have use for it later. But I never got an opportunity to pick it up again. It's probably still there."

"How do you feel now?"

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Ticos shrugged. "I've stopped twitching. Otherwise—physically exhausted, mentally alert. Uncomfortably alert, as a matter of fact. I gather you've had experience with nerve guns?"

"Our kinds," said Nile. "The Parahuan items seem to produce the same general pattern of effects."

"Including mental hyperstimulation?"

"Frequently. If it's a light charge, a grazing shot—which is what you caught—the stimulation should shift to drowsiness suddenly. When it does, don't fight it. Just settle down in the pod, curl up and go to sleep. That's the best medicine for you at present."

"Not at present!" Ticos said decidedly. "Now that we've hit a lull in the action, you can start answering some questions. That ship you may have contacted—"

"A sledman racer. It was waiting for a message from me."

"Why? How did it happen to be there?"

Nile told him as concisely as possible. When she finished, he said, "So nobody out there has really begun to suspect what's going on. . . ."

"With the possible exception of Tuvelas," Nile said dryly.

"Yes, the Tuvelas. Gave you quite an act to handle there, didn't I?"

"You did. But it kept me from being clobbered in the air. The Parahuans have been creating the recent communication disturbances?"

"They've been adding to the natural ones. Part of the Great Plan. They're familiar with the comm systems in use here. They worked out the same general systems on their own water worlds centuries ago. So they know how to go about disrupting them."

"What's the purpose?"

"Testing their interference capability. Conditioning the humans to the disturbances. Just before they strike, they intend to blank out the planet. No outgoing messages. Knock off spaceships attempting to leave or coming in. Before anyone outside the system gets too concerned about the silence, they intend to be in control."

Nile looked at him, chilled. "That might work, mightn't it?"

"Up to that point it might. I'm no trained strategist—but I believe the local defenses aren't too impressive."

"They aren't designed to deal with major invasions."

"Then if the Voice of Action can maintain the previous organization —coordinate the attack, execute it in planned detail—I should think they could take Nandy-Cline. Even hold it a while. The situation might still be very much touch and go in that respect. Of course the probability is that they killed too many dissenting Palachs tonight to leave their military apparatus in good working condition. And in the long

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run the Great Plan is idiotic. Porad Anz and its allies don't have a reasonable chance against the Hub."

"Are you sure of that?"

"I am. Take their own calculations. They've studied us. They've obtained all the information they could, in every way they could, and they've analyzed it in exhaustive detail. So they wound up with the Tuvela Theory. A secretly maintained strain of superstrategists . . ."

"I don't see how they ever got to the theory," Nile said. "There isn't really a shred of evidence for it."

"From the Palachs' point of view there's plenty of evidence. It was a logical conclusion when you consider that with very few exceptions they're inherently incapable of accepting the real explanation—that on the level of galactic competition their species is now inferior to ours. They've frozen their structure of civilization into what they consider a pattern of perfection. When they meet conditions with which the pattern doesn't cope, they can't change it. To attempt to change perfection would be unthinkable. They met such conditions in their first attempt to conquer Hub worlds. They failed then. They'd meet the same conditions now. So they'd fail again."

"They've acquired allies," Nile said.

"Very wobbly ones. Porad Anz could never get established well enough to draw them into the action. And they're showing sense. Various alien civilizations tried to grab off chunks of the Hub while the humans were busy battling one another during the war centuries. All accounts indicate the intruders got horribly mangled. How do you account for it?"

Nile shrugged. "Easily enough. They got in the way of a family fight—and the family had been conditioned to instant wholesale slaughter for generations. It isn't surprising they didn't do well. Frankly I have begun to wonder just how prepared we'd be generally to handle that kind of situation now. The nearest thing to a war the Hub's known for a long time is when some subgovernment decides it's big enough for autonomy and tries to take on the Federation. And they're always squelched so quickly you can hardly call it a fight."

"So they are," Ticos agreed. "What do you think of the Federation's Overgovernment?"

She hesitated. One of the least desirable aftereffects of a nerve gun charge that failed to kill could be gradually developing mental incoherence. If it wasn't given prompt attention, it could result in permanent derangement. She suspected Ticos might be now on the verge of rambling. If so, she'd better keep him talking about realities of one kind or another until he was worked safely past that point. She said, "That's a rather general question, isn't it? I'd say I simply don't think

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about the Overgovernment much."

"Why not?"

"Well, why should I? It doesn't bother me and it seems able to do its job—as witness those squelched rebellious subgovernments."

"It maintains the structure of the Federation," Ticos said, "because we learned finally that such a structure was absolutely necessary. Tampering with it isn't tolerated. Even the suggestion of civil war above the planetary level isn't tolerated. The Overgovernment admittedly does that kind of thing well. But otherwise you do hear a great many complaints. A recurrent one is that it doesn't do nearly enough to control the criminal elements of the population."

Nile shook her head. "I don't agree! I've worked with the Federation's anticrime agencies here. They're efficient enough. Of course they can't handle everything. But I don't think the Overgovernment could accomplish much more along those lines without developing an oppressive bureaucratic structure—which I certainly wouldn't want."

"You feel crime control should be left up to the local citizenry?"

"Of course it should, when it's a local problem. Criminals aren't basically different from other problems we have around. We can deal with them. We do it regularly."

Ticos grunted. "Now that," he remarked, "is an attitude almost no Palach would be able to understand! And it seems typical of our present civilization." He paused. "You'll recall I used to wonder why the Federation takes so little obvious interest in longevity programs, eugenics projects and the like."

She gave him a quick glance. Not rambling, after all? "You see a connection?"

"A definite one. When it comes to criminals, the Overgovernment doesn't actually encourage them. But it maintains a situation in which the private citizen is invited to handle the problems they create. The evident result is that criminality remains a constant threat but is kept within tolerable limits. Which is merely a small part of the overall picture. Our society fosters aggressive competitiveness on almost all levels of activity; and the Overgovernment rarely seems too concerned about the absolute legality of methods used in competition. The limits imposed usually are imposed by agreements among citizen organizations—who also enforce them."

"You feel all this is a kind of substitute for warfare?"

"It's really more than a substitute," Ticos said. "A society under serious war stresses tends to grow rigidly controlled and the scope of the average individual is correspondingly reduced. In the kind of balanced anarchy in which we live now, the individual's scope is almost as wide as he wants to make it or his peers will tolerate. For the large class of nonaggressive citizens who'd prefer simply to be allowed

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to go about their business and keep out of trouble that's a nonoptimum situation. They're presented with many unpleasant problems they don't want, are endangered and occasionally harassed or destroyed by human predators. But in the long run the problems never really seem to get out of hand. Because we also have highly aggressive antipredators. Typically, they don't prey on the harmless citizen. But their hackles go up when they meet their mirror image, the predator—from whom they can be distinguished mainly by their goals. When there are no official restraints on them, they appear to be as a class more than a match for the predators. As you say, you handle your criminals here on Nandy-Cline. Wherever the citizenry is making a real effort, they seem to be similarly handled. On the whole our civilization flourishes." He added, "There are shadings and variations to all this, of course. The harmless citizen, the predator and the antipredator are ideal concepts. But the pattern exists and is being maintained."

"So what's the point?" Nile asked. "If it's maintained deliberately, it seems rather cruel."

"It has abominably cruel aspects, as a matter of fact. However, as a species," said Ticos, "man evolved as a very tough, alert and adaptable creature, well qualified to look out for what he considered his interests. The war centuries honed those qualities. They're being even more effectively honed today. I think it's done deliberately. The Overgovernment evidently isn't interested in establishing a paradisiac environment for the harmless citizen. It's interest is in the overall quality of the species. And man as a species remains an eminently dangerous creature. The Overgovernment restricts it no more than necessity dictates. So it doesn't support the search for immortality—immortality would change the creature. In what way, no one can really say. Eugenics should change it, so eugenics projects aren't really favored, though they aren't interfered with. I think the Overgovernment prefers the species to continue to evolve in its own way. On the record, it's done well. They don't want to risk eliminating genetic possibilities which may be required eventually to keep it from encountering some competitive species as an inferior."

Nile said after a pause, "Well, that's mainly speculation, Ticos."

"Of course it is. But it's no speculation to say that the Hub still has its Tuvelas and that they're as thoroughly conditioned to act at peak performance as they ever were in the pre-Federation days. Further, there's now a relatively huge number of them around. That's what makes the position of the Parahuans and their potential allies impossible. They aren't opposed by a narrow caste of Guard-

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ians. They'd hit automatic Tuvela strategy again wherever and whenever they tried to strike. A few, a very few, of the Palachs realized that. Moga was one of them. That's why he killed himself."

"Moga killed himself?"

"At the crucial moment in the lab," Ticos said, "you rather cravenly dropped flat on your face. Since nobody was pointing a gun at me, I remained standing and watched. Moga couldn't foresee exactly what would happen, but I knew he'd been aware of the purpose of my specimens for some time. He understood that he and the group which came into the lab with him would have to die if we were to escape. We had to escape to keep the Voice of Action checked. When the moment came, Moga was quite ready. The others didn't find time to squeeze their gun studs. He found time to pitch that bag at you so you would get your gun back. You see, he knew you were a very competent but still very vulnerable human being. He didn't believe at all in the legend of the invincible Tuvela. But he had to do what he could to help preserve the legend. He had a cold, hopeless hatred for humanity because he had realized it was the superior species. And as he said, he was in deathly fear for Porad Anz. The Everliving as a whole were simply unable to understand that mankind could be superior to them. The concept had no meaning. But they could be persuaded to withdraw if they became convinced that the freakish supermen who ruled humanity were truly invincible. So, in effect, Moga conspired with me, and later with you, to produce that impression on them . . ."

He paused, shook his head, yawned deeply. Nile watched him.

"You see, I . . . uh, what . . ." His voice trailed off. His eyes were half closed now, lids flickering. After a moment his head began to sag.

"How do you feel?" she asked.

"Huh?" Ticos raised his head again, shook it. "I don't know," he said hesitantly. "There was—mental confusion for a moment . . . swirling bright lights. Don't quite know how to describe it." He drew a deep breath. "Part of the nerve charge effect, I suppose?"

"Yes, it is," she said. "Neural agitators are dirty weapons. You never know what the results will be. The particular kind of thing you're experiencing can build up for hours. When it does, it may cause permanent brain damage."

Ticos shrugged irritably. "What can I do about it? I've been blocking the stuff, but it seems to be leaking through to me now."

"Sleep's indicated. Plenty of sleep —preferably not less than a day or two. After that you should be all right again."

"The problem there," Ticos said, "is that I don't believe I'll be able to sleep without drugs. And

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we don't—" He glanced at her. "Or do we?"

"We do. I saw balath seeds on the way here and brought a few along."

He grunted. "Think of everything, don't you? Well, I'll be no good to the cause in the shape I'm in; that's obvious. Better give me the balath and get on about your Tuvela business. Try to make it back here though, will you?"

"I will." The natural end to the balath sleep was death—for the human organism, in about a week. Ticos knew that if she couldn't get him to the mainland and to antidotes presently, he wouldn't wake up again.

He took three soft-shelled seeds from her hand, said, "Hold your breath—good luck!" and cracked them between his fingers, close to his face. Nile heard him breathe deeply as the balath fumes drifted out from the seeds. Then he sighed, slumped back and slid down out of sight into the pod. After a few seconds, the pod cover closed over the vacated opening. Well, he'd be as safe in there for a while as he could be anywhere in this area.

She reset the belt, checked her gear. Then paused a moment, head turned up. Something—a brief muffled thudding, as much body sensation as sound. It seemed to come from the sky. She'd heard similar sounds twice before while Ticos was talking. Evidently he hadn't heard them. They might have been the rumble of thunder, but she didn't think it was thunder.

Lightweight again, she moved back quickly along the living cables to the floatwood bough which intersected the incubator and on to the barrier hedge. She laid her hands for a moment against the hedge's branches. They opened quietly for her, and she slipped out into the forest.

For a minute she stood glancing about and listening. The thudding noise hadn't been repeated and there were no other indications of abnormal activity about. A great racket was starting up in the sea-haval rookery; but the sea-havals, young and old, needed no abnormal activities to set them off. Nile descended quickly through the forest until she heard water surge and gurgle below, then moved back to the lagoon.

The sky was almost cloudless now, blazing with massed starshine. She gazed about the lagoon from cover. At the base of the forest across from her a string of tiny bright-blue lights bobbed gently up and down. Were they looking for her over there? She twisted the otter caller.

Sweeting appeared, bubbling and hunting-happy, eager to be given fresh instructions. The tarm was dying or dead. The otters had rammed a fresh battery of poison thorns into it when it came out into the water, and shortly afterwards it sank to the

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lagoon's root floor, turned on its side and stopped moving. Next they discovered a large group of armed Parahuans prowling about the floating pads and other vegetation in the central area of the lagoon. The otters accompanied them in the water, waiting for opportunities to strike. Opportunities soon came. By the time the search party grew aware of losses in its ranks, eight lifeless Oganoons had been left wedged deep among the root tangles.

"You didn't let yourselves be seen?"

Sweeting snorted derisively.

"Waddle-foot jumps into water. Doesn't come up. Is sad, heh? Seahaval eat him? Guardian Etland eat him? No otters there then."

Nile could picture it. A subsurface swirl in the dark water, three or four slashes, another flopping body hauled quickly down towards the roots . . . and no slightest indication of the nature of the attacker. The remaining Parahuans had bunched up together on the pads, keeping well away from the water. When lights began to flash and several boats approached, bristling with guns, Sweeting and her companions moved off. From a distance they watched the boats take the search party away.

Presently then: "Bloomp-bloomp! Big gun—"

Which explained the thudding noises Nile had heard. Great geysers boiled up suddenly from the area where the Parahuans had been waylaid. The fire came from a hidden emplacement on the far side of the lagoon. Sweeting described pale flares of light, soft heavy thumps of discharge. A medium energy gun—brought into action in hopes of destroying what? The Tuvela? The Palachs would have no other explanation for what had happened out there. And if they'd realized by now that their great tarm was also among the dead or missing . . .

"What were they shooting at later?" she asked.

Sweeting tilted her nose at the sky, gave the approximate otter equivalent of a shrug. "Up there! Kesters . . ."

"Kesters?"

Kesters it seemed to have been. Perhaps the gun crew had picked up a high-flying migratory flock in its instruments and mistaken it for human vehicles. In any case, some time after the discharge a rain of charred and dismembered kester bodies briefly sprinkled the lagoon surface.

Nile chewed her lip. Parrol couldn't possibly be about the area yet, and that some other aircar should have chanced to pass by at this particular time was simply too unlikely. It looked like a case of generally jittery nerves and growing demoralization. Ticos had questioned whether the Voice of Action would be able to maintain the organization of the forces which were now under its sole control.

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"And this last time?" she asked. Water stirred at her left as she spoke. She glanced over, saw that the wild otter pair had joined them, lifted a hand in greeting. They grinned silently, drifted closer.

"Wasn't us," Sweeting told her. The fire had been directed into the lagoon again, near the western end of the island. The otters hadn't been anywhere near those waters. Another panic reaction?

"What are they doing over there?" Nile asked. She nodded to the north, across the lagoon. The pinpricks of blue light moved slowly along the base of the forest.

The otters had investigated them. A flotilla of small submersibles had appeared, presumably dispatched by the great command ship in the depths. Each was marked by one of the lights—purpose unknown. They were stationing sentries in pairs along the edge of the forest.

Nile considered it. The beginning of a major organized drive to encircle the Tuvela in the lagoon—assuming the energy gun hadn't got rid of her? It seemed improbable. Sentries normally were put out for defensive purposes. They had at least one gun emplacement over there, perhaps other posts that looked vulnerable to them. They might be wondering whether the Tuvela would presently come out of the water and start doing something about those posts . . .

How open were the sentries to attack?

The otters had been considering the point when Sweeting picked up Nile's signal. The Parahuans were stationed above water level, at varying heights. One pair squatted on a floatwood stub not much more than fifteen feet above the lift of the waves. There was no visual contact between most of the posts.

Nile had seen Spiff and Sweeting drive up twenty-five feet from the surface of the sea to pluck skimming kesters out of the air . . .

"If you can pick off that one pair before they squawk," she said, "do it. It will keep the rest of them interested in that side of the lagoon for a while. Stay away from there afterwards . . . and don't bother any other waddle-feet until you hear from me."

They agreed. "What you doing now, Nile?" Sweeting asked.

"Getting a fire started so Dan can find us."

IX

She moved steadily upward. The ancient floatwood trunks swayed and creaked in the wind; lesser growth rustled and whispered. The uneasy lapping of the ocean receded gradually below.

When she had come high enough, she turned towards the sea-haval rookery. The thickest sections of the oilwood stand rose somewhat beyond it. A swirl of the wind brought the rookery's stenches simmering about her. Vague rumblings rose

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through the forest. The area was quieter than it had been in early evening, but the gigantic feedings and the periodic uproar connected with them would continue at intervals through the night. She kept well above the rookery in passing. It was like a huge dark cage, hacked and sawn by great toothed beaks out of the heart of the forest. Intruders there were not viewed with favor by the sea-havals.

She was perhaps three hundred feet above the rookery and now well over towards the southern front of the forest when she came to an abrupt halt.

Throughout these hours her senses had been keyed to a pitch which automatically slapped a danger label on anything which did not match normal patterns of the overall forest scene. The outline which suddenly impressed itself on her vision was more than half blotted out by intervening thickets; but her mind linked the visible sections together in an instant. The composite image was that of a very large pale object.

And that was enough. She knew in the same moment that another tarm had been brought to the island by the Parahuans.

Nile stood where she was, frozen with dismay. There was no immediate cover available here; the slightest motion might bring her to the tarm's attention. The massive latticework of the forest was fairly open, with only scattered secondary growth between her and the clusters of thickets along the great slanted branch where the giant thing lay. The wild otters had reported seeing two of the creatures when the Parahuans first arrived. This one must have been kept aboard the big headquarters ship since then. It had been taken back to the surface to be used against her, had approached the island through the open sea to the south—

What was it doing in the upper forest levels? Had it already discovered her?

The answer to the first question came immediately. The wind carried the scent of all life passing through the area to the west and along the lagoon up to the tarm. It was lying in wait for an indication that the human enemy was approaching the big blockhouse. A defensive measure against the Tuvela . . . And it was possible that it had, in fact, made out her shape, approaching along the floatwood branches in the night gloom, but hadn't yet defined her as human because she didn't bring with her a human scent.

Nile took a slow step backwards, then another and a third, keeping her eyes fixed on what she could see of the tarm. As she reached the first cluster of screening growth, the great body seemed to be hunching, shifting position. The bushes closed behind her. Now the tarm was out of sight . . . and it was difficult to avoid the thought that it had waited only for that instant to come swing-

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ing cunningly through the floatwood in pursuit, grappling branches with its tentacle clusters, sliding along the thicker trunks. She ran in light-weight balance towards a huge central bole, rounded it quickly, clutching the gnarled surface with hands and grip-soles, hesitated on the far side, eyes searching the area below.

Forty feet down was a twisted branch, thickets near its far end. Nile pushed off, dropped, landed in moments, knees flexing, ran along the branch and threaded her way into the thickets. From cover, she looked back. Nothing stirred above or behind her. The tarm hadn't followed.

She moved on less hurriedly, stopped at last to consider what she could do. She was still stunned by the encounter. Scentlessness would have been no protection if she had come much closer to that lurking sea beast before she discovered it. And how could she get to the oilwood now? The tarm lay so near it that it seemed suicidal recklessness to approach the area again. She scanned mentally over the weapons the floatwood offered. There was nothing that could stop a great creature like that quickly enough to do her any good. The UW's beam would only enrage it.

She had an abrupt sense of defeat. The thing might very well lie there till morning, making it impossible to start the beacon which was to identify the island to Parrol. There *must* be something she could do to draw it away from its position.

Almost with the thought, a vast bellowing erupted about her, seeming to come from inches beneath her feet, jarring her tight-drawn nerves again . . . Only a sea-haval from the rookery below.

Nile's breath caught.

Only a sea-haval? From the rookery below—

She went hurrying on down through the forest.

Presently she returned, retracing her former route. But now she gave every section of it careful study—glancing ahead and back, planning it out, not as a line of ascent but of a headlong descent to follow. When she came back along it, she would be moving as quickly as she could move, unable to afford a single misstep, a single moment of uncertainty about what to do, or which way to turn. A good part of that descent would be low-weight jumping; and whenever one of the prospective jumps looked at all tricky, she tried it out before climbing farther.

She reached a point at last where she must be within a minute of sighting the tarm . . . if it had stayed where it was. For it might have been having second thoughts about the upright shape which had been coming towards it and then backed away, and be prowling about for her now. Nile moved as warily and stealthily as she ever had in her life until she knew she was within

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view of the branch where the tarm had lain. She hadn't approached it from the previous direction but had climbed up instead along the far side of the great bole which supported most of the floatwood and other growth in the area.

When she edged around the bole, she saw the tarm immediately where she had judged it would be—flattened out on the branch, the head end of the big worm body turned towards her. A great lidless pale eye disk seemed fixed on the bole. Something thick and lumpy—the mass of retracted tentacles—stirred along the side. There was a deceptively sluggish heavy look about the thing.

Nile glanced back and down along her immediate line of retreat. Then she took the UW from its holster and stepped out on a branch jutting from the massive trunk. Weaving tips lifted abruptly from the tarm's clumped tentacles. Otherwise it didn't move. Nile pointed the gun at the center of the horny eye lens and held down the trigger.

The tarm's body rose up. Nile snapped the gun into the holster, slipped back around the bole. Turned and sprang.

There was a sound of something like tons of wet sand smashing against the far side of the bole as she darted through a thicket thirty feet down. She swung out below the thicket, dropped ten feet, dropped twenty-five feet, dropped again, descending a stairway of air . . .

A deep howling swept by overhead, more like the voice of the storm than that of an animal. Nile turned, saw the tarm, contracted almost to the shape of a ball, hurtle through smashing growth a hundred feet above, suspended from bunched thick tentacles. She pulled out the UW and held the beam centered on the bulk, shouting at the top of her lungs. The awesome cry cut off and the big body jerked to a stop, hung twisting in midair for an instant, attached by its tentacles to fifty points of the floatwood. Then the tarm had located her and swiftly came down. Nile slipped behind a trunk, resumed her retreat.

She was in and out of the tarm's sight from moment to moment, but the next series of zigzagging downward leaps did not draw her away from it again. She heard its crashing descent, above and to this side or that, always following, cutting down distance between them—then stench and noise exploded about. Strain blurred her vision, but there was a wide opening among the branches below and she darted towards it. A horizontal branch came underfoot—a swaying narrow bridge, open space all about and beneath. Sea-haval stink roiled the air. Heavy stirrings below, angry rumble . . .

A great thump behind her. The branch shook violently. The tarm's howl swelled at her back, and furious bellowings replied. The branch creaked. Ahead to the right were

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the waving thickets she remembered—

Nile flung herself headlong off the branch into the growth, clutching with arms and legs. An explosively loud crack, not yards away—another. Then, moments later, a great thudding splash below.

Then many more sounds. Rather ghastly ones . . .

Nile scrambled farther into the thicket, found solid foothold and stood up, gripping the shrubbery. She fought for breath, heart pounding like an engine. The racket below began to settle into a heavy irregular thumping as the beaks of the sea-havals slammed again and again into the rubbery monster which had dropped into their rookery, gripping a branch of floatwood . . . a branch previously almost cut through at either end by the beam of Nile's gun. The tarm was finished; the giant kesters wouldn't stop until it had been tugged and ripped apart, tossed in sections about the evil-smelling rookery, mashed to mud under huge webbed feet.

Nerves and lungs steadying gradually, Nile wiped sweat from her eyes and forehead, then looked over her gear to make sure nothing of importance had been lost in that plunging chase. All items seemed to be on hand.

And now, unless she ran into further unforeseen obstacles on the way, she should be able to get her oilwood fire started . . .

There were no further obstacles.

For the fourth or fifth time Nile suddenly came awake, roused perhaps by nothing more than a change in the note of the wind. She looked about quickly. A dozen feet below her, near the waterline, an otter lifted its oval head, glanced up. It was the wild female, taking her turn to rest while her mate and Sweeting patrolled.

"Is nothing, Nile . . ." The otter yawned.

Nile turned her wrist, looked at her watch. Still about two hours till dawn . . . She'd been dozing uneasily for around the same length of time at the sea edge of the forest, waiting for indications of Parrol's arrival. Current conditions on the island had the appearance of a stalemate of sorts. On the surface, little happened. The Parahuans had withdrawn into their installations. An occasional boat still moved cautiously about the lagoon, but those on board weren't looking for her. If anything, since the last developments, they'd seemed anxious to avoid renewed encounters with the Tuvela. There was underwater activity which appeared to be centered about the ship beneath the lagoon floor. If she'd had a jet rig, she would have gone down to investigate. But at present the ship was out of her reach; and while the otters could operate comfortably at that depth, their reports remained inconclusive.

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In spite of the apparent lull, this remained an explosive situation. And as she calculated it, the blowup wouldn't be delayed much longer . . .

It must seem to the Voice of Action that it had maneuvered itself into an impossible situation. To avoid the defeat of its policies, it had, by its own standards, committed a monstrous crime and dangerously weakened the expeditionary force's command structure. Porad Anz would condone the slaughter of the opposed Great Palachs and Palachs only if the policies could be successfully implemented.

And now, by the Voice of Action's own standards again, the policies already had failed completely to meet the initial test. The basis of their argument had been that Tuvelas could be defeated. Her death was to prove it. With the proof at hand, the fact at last established, the attack on the planet would follow.

Hours later, she not only was still alive but in effect disputing their control of the upper island areas. They must have armament around which could vaporize not only the island but the entire floatwood drift and her along with it. But while they remained here themselves, they couldn't employ that kind of armament. They couldn't use it at all without alerting the planet—in which case they might as well begin the overall attack.

Their reasoning had become a trap. They hadn't been able to overcome one Tuvela. They couldn't expect then that an attack on the Tuvelas of the planet would result in anything but failure. But if they pulled out of Nandy-Cline without fighting, their crime remained unexpiated, unjustified—unforgivable in the eyes of Porad Anz.

Nile thought the decision eventually must be to attack. Understaffed or not, their confidence shaken or not, the Voice of Action really no longer had a choice. It was simply a question now of when they would come to that conclusion and take action on it.

There was nothing she could do about that at present. At least she'd kept them stalled through most of the night; and if the Sotira racer had caught her warning, the planet might be growing aware of the peril overhanging it. Nile sighed, shifted position, blinking out through the branches before her at the sea. Starshine gleamed on the surging water, blended with the ghostly light of the luminous weed beds. Cloud banks rolled through the sky again. Fitful flickering on the nearby surface was the reflection of the oilwood . . . If Parrol would only get here—

She slid back down into sleep.

Something very wet was nuzzling her energetically. She shoved at it in irritation. It came back.

"Nile, wake up! Spiff's here!"

Grogginess vanished instantly. "Huh? Where are—"

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"Coming!" laughed Sweeting. "Coming! Not far!"

She'd picked up the tiny resonance in the caller receiver which told her Spiff was in the sea, within three miles, homing in on her. And if Spiff was coming, Parrol was with him. Limp with relief, Nile slipped down to the water's edge with the otter. Almost daybreak, light creeping into the sky behind cloud cover, the ocean black and steel-gray, great swells running before the island.

"Which way?"

Sweeting's nose swung about like a compass needle, held due south. She was shivering with excitement. "Close! Close! We wait?"

"We wait." Nile's voice was shaky. "They'll be here fast enough . . ." Parrol had done as she thought —read the oilwood message from afar, set his car down to the south, worked it in subsurface towards the floatwood front. He'd be out of it now with Spiff, coming in by jet rig and with equipment.

"Where are your friends? Has anything been happening?"

"Heh? Yes. Two ships under lagoon now. Big one."

"Two— Has the command ship moved up?"

"Not *that* big. Waddle-feet carrying in things."

"What kind of things?"

Sweeting snorted. "Waddle-feet things, heh? Maybe they leave. Ho! Spiff's here . . ."

She whistled, went forward into the water. Nile stood watching intently. Against the flank of a great rising wave two hundred yards out, two otters appeared for an instant, were gone again . . .

"You look something of a mess, Dr. Etland!"

She'd jerked half around on the first low-pitched word, had the gun out and pointing as his voice registered on her consciousness. She swore huskily. "Thought you were a . . . forget it!"

On the surface twenty feet to her right, straddling the saddle of a torpedo-shaped carrier, Parrol shoved black jet rig goggles up on his forehead, reached for a spur of floatwood to hold his position. A UW rifle was in his right hand. He grinned briefly. "Dr. Cay?"

"All right for the moment," Nile said. She replaced her gun, hand shaking. "Did you run into trouble coming in?"

"None at all. The immediate area's clear?"

"At present."

Parrol had left the mainland in response to Nile's first call for help nine hours previously. Most of the interval he'd spent being batted around in heavy typhoon weather with a static-blocked communicator. He was within two hours of the island when he got a close-contact connection with sledman fleet units and heard for the first time that Dr. Etland meanwhile had got out another message. The Sotira racer had

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received her chopped-off report about Parahuans, carried it within range of other sleds. It was relayed through and around disturbance areas, eventually had reached the mainland and apparently was reaching sled fleet headquarters all about Nandy-Cline. Parrol's informants couldn't tell him what the overall effect of the warning had been; if anything, communication conditions had worsened in the meantime. But there seemed to be no question that by now the planet was thoroughly alerted.

They speculated briefly on the possibilities. There might or might not be Federation warships close enough to Nandy-Cline to take an immediate hand in the matter. The planet-based Federation forces weren't large. If they were drawn into defensive positions to cover key sections of the mainland, they wouldn't hamper the Parahuans much otherwise. The mainland police and the Citizens Alert Cooperative could put up a sizable fleet of patrol cars between them. They should be effective in ground and air encounters but weren't designed to operate against heavily armed spacecraft. In general, while there were weapons enough around Nandy-Cline, relatively few were above the caliber required to solve personal and business problems.

"The sleds have unwrapped the old spaceguns again," said Nile. "They'll fight, now they know what they'll be fighting."

"No doubt," Parrol agreed. "But the Navy and Space Scouts are the only outfits around organized for *this* kind of thing. We don't know if they're available at present—or in what strength. If your web-footed acquaintances can knock out communications completely . . ."

"Evidently they can."

Parrol was silent a moment. "Could get very messy!" he remarked. "And in spite of their heavy stuff, you figure they're already half convinced they'll lose if they attack?"

"Going by their own brand of logic, they must be. But I don't think it will keep them from attacking."

Parrol grunted. "Well, let's talk with the otters again . . ."

The wild otters had joined the group. They confirmed Sweeting's report of the arrival of a second ship beneath the lagoon. It was more than twice the size of the first, anchored directly behind it. Parahuans were active about both. Parrol and Nile asked further questions and the picture grew clear. The second ship seemed to be a cargo carrier, and the Parahuans apparently were engaged in dismantling at least part of the equipment of their floatwood installations and storing it in the carrier.

"So they're clearing the decks," Parrol said. "And not yet quite ready to move. Now, if at this stage we could give them the impression that the planet *was* ready—in fact,

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was launching an attack on them . . ."

Nile had thought of it. "How?" she asked. "It would have to be a drastic demonstration now. Not blowing up their blockhouse. Say something like hitting the command ship."

"We can't reach that. But we can reach the two under the lagoon. And we can get rather drastic about them."

"With what?"

"Implosion bombs," Parrol said. "Your message suggested I should bring the works, so I did. Three Zell-Eleven two-pounders, tactical, adherent." He nodded at the equipment carrier in the water below them. "In there with the rest of it."

"Their ship locks are open," said Nile, after a moment.

"Two should do it. One in each lock."

"Spaceships. It may not finish them. But—"

They glanced over at Spiff. He'd been watching them silently, along with the other three.

"Like to do a little bomb hauling again, Spiff?" Parrol inquired.

The big otter's eyes glistened. He snorted. Parrol got to his feet.

"Brought your rig," he told Nile. "Let's go pick up Dr. Cay and get him out to the car. He'll be safest there. Then we'll take a look at those ships . . ."

Trailing Parrol and the carrier out to the aircar, Nile darted along twenty feet below the surface, the twin to his UW rifle clasped against her, luxuriating in the jet rig's speed and maneuverability. They'd left the otters near the floatwood; fast as they were, Sweeting and her companions couldn't have maintained this pace. It was like skimming through air. The rig's projected field very nearly canceled water friction and pressure; the rig goggles clamped over Nile's eyes pushed visibility out a good two hundred yards, dissolving murk and gloom into apparent transparency. Near the surface, she was now the equal of any sea creature in its own element. Only the true deeps remained barred to the jet rig swimmer. The Parahuan rigs she'd seen had been relatively primitive contrivances.

Parrol, riding the carrier with Ticos Cay asleep inside, was manipulating the vehicle with almost equal ease. It, too, had a frictionless field. He slowed down only in passing through the denser weed beds. By the time they reached the aircar, riding at sea anchor in the center of a floating thicket, a blood-red sun rim had edged above the horizon.

They got Ticos transferred to the car, stowed the carrier away, locked the car again, made it a subsurface race back to the floatwood and gathered up the otters. Spiff and Sweeting knew about tactical bombs by direct experience; their wild cousins knew about human explosives only by otter gossip and were decidedly interested in the op-

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eration. Roles were distributed and the party set off. Spiff, nine-foot bundle of supple muscle, speed, and cold nerve, carried two of Parrol's implosion devices strapped to his chest in their containers. He'd acted as underwater demolition agent before. Parrol retained the third bomb—

And shortly Nile was floating in a cave of the giant roots which formed the island floor, watching the open locks of the two Parahuan spaceships below. A fog of yellow light spilled from them. Two points of bright electric blue hovered above the smaller ship, lights set in the noses of two midget boats turning restlessly this way and that as if maintaining a continuous scan of the area. There were other indications of general uneasiness. A group of jet-rigged Oganoon, carrying the heavy guns with which she had become familiar, floated between the sentry boats; and in each of the locks a pair of guards held weapons ready for immediate use.

All other activities centered about the lock of the larger ship. Parahuans manipulating packaged and crated items were moving into it from the sea in escorted groups, emerging again to jet off for more. Like the guards they carried guide lights fastened to their heads.

Nile glanced around as Spiff came sliding down out of the root tangles above. The otters had returned to the surface to saturate themselves with oxygen before the action began. Spiff checked beside her, peering out through the roots at the ships, then tilted his head at her inquiringly. His depth-dark vision wasn't equal to hers but good enough for practical work. Nile switched on her rig speaker. "Dan?"

"I read you."

"Spiff's back and ready to go."

"My group's also on hand," Parrol's voice told her. "We'll start the diversionary action. Sixty seconds, or any time thereafter—"

Nile's muscles tightened. She gave Spiff a nod, watched him start off among the roots. Resting the barrel of the UW rifle on the root section before her, she glanced back and forth about the area below. Her position placed her midway between the two ship locks; Spiff was shifting to the right, to a point above the lock of the cargo carrier, his first target. Where Parrol and the other three otters were at the moment she didn't know.

A group of Oganoon approached the cargo lock again, guiding a burdened transport carrier. As they moved into the lighted area, the one in the lead leaped sideways and rolled over in the water, thrashing violently. The next in line drifted limply upwards, long legs dangling. The rippling sound of Parrol's UW reached Nile's audio pickup a moment later.

There was abrupt milling confusion around and within the lock. The rest of the transport crew was

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struggling to get inside past the guards. Thumping noises indicated that a number of Parahuan weapons had gone off. A medley of watery voice sounds filled the pickup. Then one of the little boats was suddenly in purposeful motion, darting at a slant up from the ships towards the root floor of the island. The other followed.

"Boats have a fix on you and are coming, Dan!"

"I'm retreating."

The boats reached the roots, edged in among them. The patrol above the smaller ship had dispersed, was now regrouping. Somebody down there evidently was issuing orders. Nile waited, heart hammering. Parrol's rifle snarled, drew a heavier response, snarled again. Among the roots he had a vast advantage in mobility over the boats. A swarm of armed Parahuans jetted out from the smaller ship's lock. One of them shifted aside, beckoned imperiously to the patrol above. They fell in line and the whole group moved quickly up to the roots. Their commanding officer dropped back into the lock, stood gazing after them.

"The infantry's getting into the act," Nile reported.

"Leaving the ships clear?"

"Clear enough."

The transport crew had vanished inside the carrier. Its two guards floated in the lock, shifting their weapons about. The pair on duty in the other lock must still be there, but at the moment only the officer was in sight. Nile studied him. Small size, slight build—a Palach. He might be in charge of the local operation . . . Parrol's voice said, "I've given the otters the go ahead. They're hitting the infantry. Move any time!"

Nile didn't answer. She slid the rifle barrel forward, sighted on one of the carrier guards, locked down the trigger, swung to the second guard as the fist one began a back somersault. In the same instant she saw Spiff, half the distance to the carrier already behind him, doubling and thrusting as he drove down in a hunting otter's awesomely accelerating sprint. He'd picked up his cue.

Now the Palach at the smaller ship floated in the rifle's sights, unaware of events at the carrier. Nile held fire, tingling with impatience. The two guards there hadn't showed again; she wanted them out of the way before Spiff arrived. The Palach glanced around, started back into the lock. She picked him off with a squeeze of her finger—and something dark curved down over the hull of the ship, flicked past the twisting body and disappeared in the lock.

Nile swallowed hard, slipped forward and down out of the cover of the roots. There were thumping sounds in the pickup; she couldn't tell whether some of them came now from the ship. Her mind was counting off seconds. Parrol's voice

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said something, and a moment later she realized she hadn't understood him at all. She hung in the water, eyes fixed on the lock entrance. Spiff might have decided his second implosion bomb would produce a better effect if carried on into the spaceship's guts—

A Parahuan tumbled out of the lock. Nile's hand jerked on the rifle, but she didn't fire. *That* Parahuan was dead! Another one . . .

A weaving streak emerged from the lock, rocked the turning bodies in its passage, seemed in the same instant a hundred feet away in the water, two hundred—

Nile said shakily, "Bombs set, Dan! *Jet off!*"

She swung about, thumbed the rig's control grip, held it down, became a glassy phantom rushing through the dimness in Spiff's wake.

Lunatic beast—

Presently the sea made two vast slapping sounds behind them.

There was light at the surface now. Sun dazzle shifted on the lifting waves between the weed beds. The front of the floatwood island loomed a quarter of a mile to the north. Flocks of kesters circled and dipped above it, frightened into the upper air by the implosions which had torn out a central chunk of the lagoon floor.

"Can you see me?" Parrol's voice asked.

"Negative, Dan!" Nile had shoved the rig goggles up on her head. Air sounds rolled and roared about her. "Too much weed drift! I can't get far enough away from it for a clear look around."

"Same difficulty here. We can't be too far apart."

"Nobody seems to be trailing us," Nile said. "Let's keep moving south and clear this jungle before we try to get together."

Parrol agreed and she submerged again. Spiff and Sweeting were around, though not in view at the moment. The wild otters had stayed with Parrol. There was no real reason to expect pursuit; the little gunboats might have been able to keep up with them, but the probability was that they'd been knocked out among the roots by the bombs. She went low to get under the weed tangles, gave the otter caller a twist, glanced at her rig compass and started south. Parrol had a fix on the aircar. She didn't; but he'd said it lay almost due south of them now.

Sweeting and Spiff showed up half a minute later, assumed positions to her right and left . . . Then there was a sound in the sea, a vague dim rumbling.

"You getting that, Nile?"

"Yes . . . Engine vibrations?"

"Should be something of that order. But it isn't exactly like anything I've ever heard. Any impression of direction?"

"No." She was watching the otters. Their heads were turning about in quick darting motions. "Sweeting and Spiff can't tell where it's coming

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from either . . ." She added, "It seems to be fading at the moment."

"Fading here, too," Parrol said. "Let's keep moving."

They maintained silence for a minute or two. The matted canopy of weeds still hung overhead. The strange sound became almost inaudible, then slowly swelled, grew stronger than before. There was a sensation as if the whole sea were shuddering faintly and steadily about her. She thought of the great spaceship which had been stationed in the depths below the floatwood drift these months. If they were warming up its drives, it might account for such a sound.

"Nile," Parrol's voice said.

"Yes?"

"Proceed with some caution! Our wild friends just showed up again. They indicate they have something significant to report. I'm shifting to the surface with them to hear what it is."

"All right," said Nile. "We'll stay awake."

She moved on, holding rig speed down to her companions' best traveling rate. The dim sea thunder about them didn't seem to change. She was about to address Parrol when his voice came again.

"Got the report," he said. "There's a sizable submersible moving about the area. Evidently it is *not* the source of the racket we're hearing. It's not nearly large enough for that. The otters have seen it three times—twice in deeper water, the third time not far from the surface. It was headed in a different direction each time. It may not be interested in us, but I get the impression it's quartering this section. That seems too much of a coincidence."

Nile silently agreed. She said, "Their detectors are much more likely to pick up your car than us."

"Exactly."

"What do we do, Dan?"

"Try to get to the car before the sub does. You hold the line south, keep near cover if you can. Apparently I'm somewhere ahead of you and, at the moment, closer to the sub. The otters are out looking for it again. If we spot it on the way to the car, I'll tag it."

"Tag it?"

"With bomb number three," Parrol said. "Had a feeling it might be useful before we were through . . ."

Nile gave Spiff and Sweeting the alert sign, indicating the area before them. They pulled farther away on either side, shifted to points some thirty feet ahead of her. Trailing weed curtains began limiting visibility and the overhead blanket looked as dense as ever. The rumbling seemed louder again, a growing irritation to tight nerves . . . Then soggy tendrils of vegetation suddenly were all about. Nile checked rig speed, cursing silently, pulled and thrust through the thicket with hands and feet. And stopped as she met Sweeting coming back.

Something ahead . . . She fol-

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lowed the otter down through the thicket to the edge of open water. Other drift thickets in the middle distance. Sweeting's nose pointed. Nile watched. For an instant then, she saw the long shadow outline of a submersible glide past below. Her breath caught. She cut in the rig, came spurting out of the growth, drove after the ship—

"Dan!"

"Yes?"

"If you see that sub, *don't* try to tag it!"

"Why not?"

"Because it's ours, idiot! I was looking down on it just now. It's a Narcotics Control boat! And at a guess the reason it's been beating around here is that it has its detectors locked on the Parahuan command ship—"

The receiver made a muffled sound of surprise. Then, quickly: "It's probably not alone!"

"Probably not. How far do you register from your car?"

"Nine hundred yards," Parrol's voice said. "By the time we get together and make it there, we might—"

"We might be in the middle of a hot operation!"

"Yes. Let's get back upstairs and see what we can see."

Nile jetted up through the water, trailed by darting otter shapes, broke surface in a surging tangle of drift growth, began splashing and crawling out of the mess. Morning sun blazed through wind-whipped reeds about and above her.

"Nile," snapped the intercom, "their ship's here!"

"*Their* ship?"

"It's got to be the Parahuan. Something beneath me—lifting! Looks like the bottom of the ocean coming up. Keep out of the way—that thing is *big!* I'm scrambling at speed."

The intercom went silent. Nile stumbled across a pocket of water, lunged through a last tangle of rubbery brown growth, found open sea before her. The drift was rising sluggishly on a great swell. She shoved the goggles up on her head. Something shrieked briefly above. An aircar swept past, was racing back into the sky. Higher up, specks glinted momentarily, circling in the sun. A chain of patrol cars, lifting towards space, cutting through the aliens' communication blocks—

The swell had surged past; the weed bed was dropping towards its trough, shut off by a sloping wall of water to the south. Nile knifed into the sea, cut in the rig, swept upwards, reached and rode the shifting front of the wave. View unobstructed—

"Sleds coming, Dan! Three of them."

His voice said something she didn't catch. Off to the right, less than half a mile away, the black hull of the Parahuan command ship lifted glistening from the sea. Rounded back of a giant sea beast.

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Nile tried to speak again and couldn't. Wind roar and sea thunder rolled about her. Out of the west, knifing lightly through the waves like creatures of air, the three sleds came racing in line on their cannon drives. On the foredeck of the one in the lead, the massive ugly snouts of spaceguns swiveled towards the Parahuan ship—already a third clear of the water and rising steadily. Pale beams winked into existence between the sled's guns and the ship, changed to spouts of smashing green fire where they touched the dark hull. The following sleds swung left, curving in; there were spaceguns there, too, and the guns were in action. About the spaceship the ocean exploded in steam. Green fire glared through it. A ragged, continuous thundering rolled over Nile. The ship kept lifting. The sleds' beams clung. There was no return fire. Perhaps the first lash of the beams had sealed the ship's gunports. It surged heavily clear of the sea, fled straight up into the sky with an enormous howling, steam and water cascading back from it. The beams lifted with it, then winked out in turn, ceasing their thunder.

Nile's ears still rang with the din. Lying back in the water, she watched the ship dwindle in a brilliant blue sky.

Run, Palachs, run! But see, it's too late!

Two thin fire lines converged in the blue on the shrinking dot of the Parahuan ship. Then a new sun blazed in white fury where the dot had been. The fire lines curved away, vanished.

Federation warships had come hunting out of space . . .

She swung about in the water, saw a section of a broken floatwood bough twenty feet away, caught it and clambered aboard. A wave lifted the bough as she came to her feet, sent it rushing south. Nile rode it, balanced against a spur, gaze sweeping the sea . . . a world of brilliance, of dazzling flashes, of racing wind and tumbling whitecaps. Laughter began to surge in her, a bubbling release. One of the great sleds knifed past, not a hundred yards away, rushing on humming drives towards the island. A formation of CA patrol cars swept above it, ports open. Jet chutists would spill from the ports in minutes to start cleaning the abandoned children of Porad Anz from the floatwood.

Details might vary considerably. But as morning rolled around the world, this was the scene that was being repeated now wherever floatwood drifts rode the ocean currents. The human demon was awake and snarling on Nandy-Cline . . .

"Nile—"

"Dan! Where are you?"

"On the surface. Just spotted you. Look southwest. The aircar's registering. Dr. Cay's all right . . ."

Flick of guilt—I forgot all about Ticos! Her eyes searched, halted on a swell. There he was.

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She flung up an arm and waved, saw Parrol return the salute. Then she cut in the rig, dived from the floatwood, went down and flashed through the quivering crystal halls of the upper sea to meet him.

X

"You are *not*," said the blonde emphatically. "Dr. Ticos Cay. You are not Dr. Nile Etland. There are *no* great white decayed-looking monsters chasing you through a forest!"

Rion Gilennic blinked at her. She was an attractive young creature in her silver-blue uniform; but she seemed badly worried.

"No," he told her reassuringly. "Of course not."

The blonde brightened. "That's better! Now who are you? I'll tell you who you are. You're Federation Council Deputy Rion Gilennic."

"Quite right," Gilennic agreed.

"And where are you?"

He glanced about. "In the transmitter room."

"Anybody can see that. Where's this transmitter room?"

"On the flagship. Section Admiral Tatlaw's flagship. Oh, don't worry! When I'm myself, I remember everything. It's just that I seem to slide off now and then into being one of the other two."

"You told us," the blonde said reproachfully, "that you'd absorbed recall transcriber digests like that before!"

"So I have. I realize now they were relatively minor digests. Small doses."

She shook her head. "This was no small dose! A double dose, for one thing. A twenty-six minute bit, and a *two minute bit. Both loaded with* emotion peaks. Then there was a sex crossover on the two minute bit. That's confusing in itself. I think you've been rather lucky, Deputy! Next time you try out an unfamiliar psych machine, at least give the operators straight information. On a rush job like this we had to take some things for granted. You *could* have stayed mixed up for weeks!"

"My apologies," said Gilennic. Then he made a startled exclamation.

"Now what?" the blonde asked anxiously.

"What time is it?"

She checked her watch. "Ship or standard?"

"Standard."

She told him. Gilennic said, "That leaves me something like ten minutes to get straightened out before Councilman Mavig contacts me."

"I can give you a shot that will straighten you out in thirty seconds," the blonde offered.

"Then I won't remember the digests."

"No, not entirely. But you should still have the general idea."

Gilennic shook his head. "That's not good enough! I need all the details for the conference."

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"Well, I understand the councilman's absorbed the digests, too. He may not be in any better shape."

"That'll be the day!" said Gilennic sourly. "Nothing shakes the councilman."

She reflected, said, "You'll be all right, I think. You've been coming out of it fast . . . Those two subjects had some remarkable experiences, didn't they?"

"Yes, remarkable. Where are they at present?"

She looked concerned again. "Don't you remember? They left ship almost an hour ago. On your order. Dr. Etland wanted to get Dr. Cay back to the planet and into a hospital."

Gilennic considered. "Yes, I do remember now. That was just before this stuff began to take effect on me, wasn't it? I suppose—"

He broke off as the entrance door slid open. A trim young woman stepped in, smiled, went to the transmitter stand, placed a sheaf of papers on it, and switched on the screen. She glanced at other items on the stand and looked satisfied.

"These are the reports you wanted for the conference, Mr. Gilennic," she announced. "You'll have just time enough to check them over."

"Thanks, Wyl." Gilennic started for the stand.

"Anything else?" Wyl asked.

"No," he said. "That will be all."

Wyl looked at the blonde. "We'd better be leaving."

The blonde frowned. "The deputy isn't in good condition!" she stated. "As a Psychology Service technician, I have a Class Five clearance. Perhaps—"

Wyl took her arm. "Come along, dear. I'm Mr. Gilennic's confidential secretary and have a Class Two clearance. That isn't good enough to let me sit here and listen."

The blonde addressed Gilennic. "If you start running hallucinations again—"

He smiled at her. "If I do, I'll buzz for help. Good enough?"

She hesitated. "If you don't put it off too long, it will be. I'll wait beside the buzzer." She left the room with Wyl, and the door slid shut.

Rion Gilennic sighed and sat down at the stand. His brain felt packed—that was perhaps the best way to describe it. Two sets of memories that weren't his own had been fed in there in the time span of fifty seconds. He'd gathered the emotional effects they contained were damped out as far as possible; but they remained extraordinarily vivid memories as experienced by two different sensory patterns and recorded by two different and very keen minds. For the next several hours, a part of him would be in effect Dr. Ticos Cay, able to recall everything that had occurred from his first realization of a search party of alien beings closing in stealthily on the floatwood hideout to the moment consciousness drained from

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him in the incubator pod. And another part would be Dr. Nile Etland, scanning at will over the period between her discussion with the Sotira sledmen and her return to the mainland with Danrich Parrol, Dr. Cay, and a pair of mutant otters.

By now Gilennic's mind seemed able to recognize these implants for what they were and to keep them distinct from his personal memories. But for a while there'd been confusion and he'd found himself running colorful floatwood nightmares in a wide-awake condition, blanked out momentarily on the fact that he was not whichever of the two had experienced that particular sequence. He'd really been much less upset about it than the two transcriber technicians who evidently blamed themselves for the side effects. A recall digest, in any case, was the fastest and most dependable method known to get *all* pertinent information on a given set of events from a person who'd lived through them; and a few hours from now the direct impressions would fade from his mind again. No problem there, he decided . . .

He flicked through the reports Wyl had left. Among them was one from the surgeon's office on the condition of Dr. Ticos Cay—a favorable prognosis. In spite of his age Dr. Cay's recuperative ability remained abnormally high. He'd been near total exhaustion but should recover in a few weeks of treatment. Gilennic was glad to see the memo; he'd been worried about the old man.

The latest report on military developments had nothing of significance. Most of the fighting had been concluded five hours ago, almost before the Etland party reached the mainland. Space pursuit continued; but the number of targets was down to twelve. Gilennic considered. Call Tatlaw and tell him to let a few more get away? No, two shiploads were enough to carry the bad word to Porad Anz. Too many lucky escapees would look suspicious—the Parahuans had learned the hard way the Fed ships could run them down . . . Some eight hundred Oganoon, holed up in a floatwood island, had been taken alive. The Palachs with them were dead by suicide. No value to that catch—

The other reports weren't important. The Psychology Service was doctoring newscast sources on Nandy-Cline. He'd hear more about that in the conference.

Gilennic sat a moment reflecting, smiled briefly. Not a bad setup, he thought. Not bad at all!

"Ship's comm section to Deputy Gilennic," said the screen speaker.

"Go ahead," he told it.

"Transmission carrier now hot and steady, sir! Orado is about to come in. When I switch off, the transmission room will be security-shielded."

"Double check the shielding,"

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Gilennic said and pushed down the screen's ON button.

"What decided you to give the order to allow two Parahuan warships to escape?" Federation Councilman Mavig asked.

Gilennic looked at the two men in the screen. With Mavig was Tolm Sindhis, a Psychology Service director—publicity angles already were very much a part of the situation, as he'd expected. The discussion wasn't limited to the three of them; Mavig had said others were attending on various extensions on the Orado side. He hadn't given their names and didn't need to. Top department heads were judging the Federation Council Deputy's actions at Nandy-Cline. Very well—

Gilennic said, "Section Admiral Tatlaw's fleet detachment was still approaching the system when we picked up a garbled report from Nandy-Cline indicating the fighting had started there. Tatlaw went in at speed. By the time the main body of the detachment arrived, Parahuan ships were boiling out into space by twos and threes. Our ships split up and began picking them off.

"It was clear that something drastic had happened to the enemy on the planet. The colonial forces were in action, but that couldn't begin to account for it. The enemy wasn't in orderly retreat—he was breaking from the planet in absolute panic. Whatever the disaster was, I felt it was likely to be to our advantage if Porad Anz were permitted to receive a firsthand account of it by informed survivors.

"The flagship had engaged the two largest Parahuan ships reported so far, approximately in our cruiser class. It was reasonable to assume they had high-ranking Parahuans on board. We know now that except for the headquarters ship, which was destroyed before it could escape from the planet's atmosphere, they were in fact the two largest ships of the invasion. There was no time to check with Orado, even if it had been possible in the infernal communication conditions of the system. We were in a running fight, and Tatlaw would have cut the enemy apart in minutes. I was the leading representative of the civilian government with the detachment. Therefore I gave the order."

Mavig pursed his lips. "The admiral didn't entirely approve of the move?"

"Naturally not," said Gilennic. "From a tactical point of view it made no sense. There were some moments afterwards when I was inclined to doubt the wisdom of the move myself."

"I assume," Mavig said, "your doubts were resolved after you absorbed the digest of Dr. Etland's recall report."

"Yes. Entirely so."

Mavig grunted.

"Well, we know now what happened to the invasion force," he remarked. "Its command echelons

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were subjected to a concentrated dose of psychological warfare, in singularly appalling form. Your action is approved, Deputy. What brought Dr. Etland and her companions to your attention?"

"I went down to the planet at the first opportunity," Gilennic said. "There was still a great deal of confusion and I could get no immediate explanation for the Parahuan retreat. But I learned that a warning sent out by a Dr. Etland from one of the floatwood islands had set off the action. She reached the mainland at about that time, and I found her at the hospital to which she'd taken Dr. Cay. She told me in brief what had occurred, and I persuaded her to accompany me to the flagship with Dr. Cay. She agreed, on condition that Dr. Cay would remain under constant medical attention. She took him back to a mainland hospital a short while ago."

Mavig said, "The people who know about this—"

"Dr. Etland, Dr. Cay, Danrich Parrol," said Gilennic. "The two recall transcriber technicians know enough to start thinking. So does my secretary."

"The personnel will be no problem. The other three will maintain secrecy?"

"They've agreed to it. I think we can depend on them. Their story will be that Dr. Etland and Dr. Cay discovered and spied on Parahuans from hiding but were not seen by them and had no contact with them. There'll be no mention made of the Tuvela Theory or of anything else that could be of significance here."

Mavig glanced at the Psychology Service director. Sindhis nodded, said, "Judging by the personality types revealed in the recall digests, I believe that's safe. I suggest we give those three people enough additional information to make it clear why secrecy is essential from the Federation's point of view."

"Very well," Mavig agreed. "It's been established by now that the four other water worlds which might have been infiltrated simultaneously by Parahuans are clear. The rumored enemy action was concentrated solely on Nandy-Cline. We're proceeding on that basis." He looked at Tolm Sindhis. "I understand your people have begun with the publicity cover work there?"

"Yes," Sindhis said. "It should be simple in this case. We're developing a popular local line."

"Which is?"

"That the civilian and military colonial forces beat the fight out of the invaders before they ever got back to space. It's already more than half accepted."

Gilennic said thoughtfully, "If it hadn't been for Dr. Etland's preparatory work, I'm inclined to believe that's what would have occurred. Not, of course, without very heavy human casualties. The counterattack certainly was executed with something like total enthusiasm."

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"It's been a long time between wars," Mavig said. "That's part of our problem. How about the overall Hub reaction, Director?"

"We'll let it be a three-day sensation," said Sindhis. "Then we'll release a series of canned sensations which should pretty well crowd the Nandy-Cline affair out of the newscasts and keep it out. I foresee no difficulties."

Mavig nodded. "The follow-up then. I rather like that term 'gromgorru'. We can borrow it as the key word here."

"Gromgorru and Tuvela-Guardians," said Tolm Sindhis.

"Yes. The two escaped cruisers reach Porad Anz. The sole survivors of the invasion present their story. The top echelons of the Everliving have a week or two to let new Tuvela-fear soak through their marrows. There is no word of a significant reaction in the Federation. What happens then? Deputy, you've shown commendable imagination. How would you suggest concluding the matter?"

"How would Tuvela-Guardians conclude it?" said Gilennic. "Dr. Etland set the pattern for us, I think. The attitude is not quite contempt, but not far from it. We've taken over a thousand low-grade prisoners for whom we have no use. Guardians don't kill purposelessly. In a week or two the prisoners should be transported to Porad Anz."

"By a fleet detachment?" Mavig asked.

Gilennic shook his head.

"One ship, Councilman. An impressive ship—I'd suggest a Giant Scout. But only one. The Guardian Etland came alone to the floatwood. By choice, as far as the Parahuans know. The Guardians would not send a fleet to Porad Anz. Or more than one Guardian."

"Yes—quite right. And then?"

"From what Dr. Cay was told," Gilennic said, "there are no surviving human captives on Porad Anz. But we'd make sure of that, and we'd let them know we're making sure of it. Half dead or insane, we don't leave our kind in enemy hands."

Tolm Sindhis said, "The Service will supply a dozen xenopaths to the expedition. They'll make sure of it."

Mavig nodded. "What else, Deputy?"

"Men were murdered on Nandy-Cline," said Gilennic. "The actual murderers are almost certainly dead. But the authorities on Porad Anz need a lesson—for that, and simply for the trouble they've made. They're territory-greedy. How about territorial restrictions?"

Mavig said, "Xeno intelligence indicates they've occupied between eighteen and twenty water planets. They can be told to evacuate two of those planets permanently—say the two closest to the Federation—and given a limited time in which to carry out the order. We'll be back

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presently to see it's been done. Would that sum it up?"

"I think," said Gilennic, "a Guardian would say so." He hesitated, added, "I believe the terms Tuvela or Guardian should not be used in this connection by us, or in fact used by us at all. The Everliving of Porad Anz can form their own conclusions about who it is that issues them orders in the name of the Federation. As far as we're concerned, the superhumans can fade back now into mystery and gromgorru. They'll be more effective there."

Mavig nodded, glanced aside. "I see," he remarked, "that meanwhile the selection of the person who is to issue the Council's orders to Porad Anz has been made." He pressed a button on the stand before him. "Your transmission duplicator, Deputy —"

Rion Gilennic slid a receptacle from the stand duplicator, took a card from it, saw, without too much surprise, that the name on the card was his own. "I'm honored by the assignment," he said soberly.

"You can start preparing for it." Mavig shifted his gaze to Tolm Sindhis. "We should expect that some weeks from now there'll be individuals on Nandy-Cline taking a discreet interest in the backgrounds of Dr. Etland and Dr. Cay. It might be worth seeing what leads can be developed from them."

The director shrugged. "We'll watch for investigators, of course. My opinion is, however, that if the leads take us anywhere, they'll show us nothing new . . ."

CONCLUSIONS OF THE EVALUATING COMMITTEE OF THE LORDS OF THE SESSEGUR, CHIEFS OF THE DARK SHIPS

SUBJECT: THE HUMAN-PARAHUAN ENGAGEMENT OF NANDY-CLINE

The Committee met in the Purple Hall of the Lord Ildaan. Present besides the Lord Ildaan and the permanent members of the Committee were a Wirrollan delegation led by its Envoy Plenipotentiary. The Lord Ildaan introduced the Envoy and the members of the delegation to the Committee and referred to the frequently voiced demands of Wirrolla and its associated species that the Alliance of the Lords of the Sessegur should agree to coordinate and spearhead a unified attack on the Federation of the Hub. He explained that the conclusions to be expressed by the Committee might serve as a reply to such demands. He then requested the Lord Toshin, High Ambassador of the Alliance to the Federation of the Hub, to sum up intelligence reports compiled in the Federation following the Parahuan defeat.

THE LORD TOSHIN: The overall impression left in the Federation by the attempted Parahuan conquest of the world of Nandy-Cline

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is that it was an event of almost no significance. In the relatively short period before I left Orado to confer in person with other members of this Committee, it appeared that the average Federation citizen had nearly forgotten such an attempt had been made and certainly would have found it difficult to recall much more than the fact. We must understand, of course, that this same average citizen in all likelihood never before had heard of the planet of Nandy-Cline. The sheer number of Federation worlds blurs their individual significance.

On Nandy-Cline itself the conflict with the Parahuans naturally has remained a topic of prime interest. While we may suspect that the bulk of the Parahuan force was destroyed in space by Federation military, the continental population takes most of the credit for its defeat. No opinions have been obtained from the sizable pelagic population known as sledmen, who appear to be secretive by habit and treat Federation news personnel and other investigators with such scant civility that few attempt to question them twice.

There has been no slightest public mention in the Federation of the Parahuan Tuvela Theory. The person referred to in the reports of Parahuan survivors to Porad Anz as "the Guardian Etland," and believed by them to be a member of a special class of humans known as Tuvelas, does exist. Her name is Dr. Nile Etland and she is a native of Nandy-Cline. My office had a circumspect but very thorough investigation made of her activities and background. Most of you are familiar with the result. It indicates that Dr. Etland is very capable and highly intelligent, but in a normally human manner. She is a biochemist by training and profession, and there is nothing to suggest overtly that she might be one of a group of perhaps mutated humans who have made themselves the secret rulers and protectors of the Federation. A simultaneous investigation made of her associate, Dr. Ticos Cay, believed by the Parahuans to be possibly another Tuvela, had similar results. We have no reason to think that Dr. Cay is more or other than he appears to be.

Of particular interest is the fact that there is no public knowledge in the Federation of the role ascribed to these individuals by Parahuan survivors in bringing about the evidently panic-stricken retreat from Nandy-Cline. On the planet Dr. Etland and Dr. Cay are generally credited with having given the first warning of the presence of alien intruders, but it is assumed that this is all they did.

Under the circumstances, I felt it would be unwise to attempt to have Dr. Etland questioned directly. It would have been impossible in any case to question Dr. Cay. After a period of hospitalization, he appears to have returned to his re-

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search on one of the many floating jungles of that world; and it is believed that only Dr. Etland is aware of his current whereabouts.

THE LORD ILDAAN: The Lord Mingolm, recently the Alliance's Ambassador to Porad Anz, will comment on discrepancies between the Federation's publicized version of the Parahuan defeat and the account given by Parahuan survivors.

THE LORD MINGOLM: As the Committee knows, only two of the Parahuan invasion ships escaped destruction and eventually returned to Porad Anz. Aboard those ships were eighty-two Palachs and Great Palachs, twenty-eight of whom had been direct witnesses of the encounter between the Everliving and the female human referred to as the Guardian Etland.

All of these twenty-eight were members of the political faction known as the Voice of Action and under sentence of death for their complicity in the disastrous revolt of the faction on Nandy-Cline. All were questioned repeatedly, frequently under severe torture. I attended a number of the interrogations and on several occasions was permitted to question the subjects directly.

Their stories agreed on every significant point. Both Dr. Cay and Dr. Etland had stated openly that Dr. Etland was a Guardian of the Federation and that the designation of Tuvela applied to her. Such statements would not have convinced the Voice of Action, which had argued vehemently against the implications of the Tuvela Theory in the past, and particularly against the claim that Tuvelas appeared to have supernormal powers. However, the chain of events which began with the arrival of Dr. Etland in the area where they were holding Dr. Cay did convince them. There seemed to be nothing they could do to check her. She came and went as she chose, whether in the sea or in the dense floating forests, and was traceless as a ghost. Moreover, those who had the misfortune of encountering her did not report the fact. They simply disappeared. The list of the missing included an advanced Great Palach, renowned as a deadly fighter and the leader of the Voice of Action, and two battle-trained tarms, which are most efficiently destructive giant beasts. When a majority of the Everliving voted to parley with the Guardian, she came voluntarily into their forest stronghold, spoke to them and ordered them off the planet. The Voice of Action realized the nerve of their colleagues had broken and that the order would be obeyed. In frenzy and despair they struck out at the yielding majority and gained control of the invasion forces.

But now the situation simply worsened. The Voice of Action had made its move under the assumption that the Guardian Etland, in her willingness to speak to the Ever-

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living, had allowed herself to be trapped. At the time she was still in a guarded compartment of the stronghold, disarmed and in the company of Dr. Cay. But when a detachment was sent to execute her there, it was destroyed in a horribly vicious attack by native life forms which until then had appeared completely innocuous. Deadly fumes infested other sections of the fort; and there was so much confusion that considerable time elapsed before it was discovered that the Guardian had left the stronghold, evidently unharmed, and had taken Dr. Cay with her.

Neither of the two was seen thereafter, but there were continuing manifestations of the Guardian's presence in the area. The Great Palachs and Palachs of the Voice of Action, now in furious dispute among themselves as to what might be the best course to follow, retreated to the expedition's command ship and to two other space vessels in the vicinity. The ships were stationed at depths below the surface of the sea which seemed to place them beyond the reach of the Guardian, but presently the command ship received a fragmentary report that she was attacking the two other vessels. This was followed by violent explosions in which the two ships evidently were destroyed.

It was enough. The command ship broadcast an order to all divisions on Nandy-Cline to withdraw at once from the planet. As we know, this belated attempt to escape was not successful. The general human attack already had begun. The command ship apparently was annihilated in the planet's atmosphere, and in a short time the entire expeditionary force was virtually wiped out.

I must emphasize strongly the oppressively accumulating effect these events produced on the Parahuans during the relatively short period in which they occurred. As related by the survivors, there was a growing sense of shock and dismay, the conviction finally of having challenged something like an indestructible supernatural power. At the time they were questioned, the survivors still seemed more disturbed by this experience than by the practical fact of their own impending demise on orders of Porad Anz, of which they were aware. It is not only that at the end there were no Parahuan disbelievers in the Tuvela Theory on Nandy-Cline but that the Tuvelas seemed to have proved to be monstrously more dangerous even than had been assumed. The impression was strengthened by the fact that the Guardian Etland appeared to be a young female. The Parahuans are aware that in the human species, as in many others, it is the male who is by biological and psychic endowment, as well as by tradition, the fighter. What a fully mature male Tuvela might have done to them in the circumstances staggered their imagination. Evidently the Guard-

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ians had considered it unnecessary to employ one of their more formidable members to dispose of the invasion force—and evidently their judgment was sound.

I must conclude that the account of the surviving Parahuan witnesses was objectively correct. What they reported did occur. The interpretation we should put on these events may be another matter. But the reports circulating in the Federation obviously were distorted in that the true cause of the Parahuan rout at Nandy-Cline—that is, the appearance and actions of Dr. Etland—was not made public. I offer no opinion on the possible reasons for the falsification.

THE LORD ILDAAN: The Lord Toshin will comment.

THE LORD TOSHIN: I agree with the Lord Mingolm's conclusion. We can assume that the Parahuan survivors told the truth as they knew it. We must ask, then, why the Federation's official version of the Parahuan defeat did not refer to the Tuvela Theory, why Dr. Etland's name was barely mentioned, and why she is credited only with having warned of the enemy's presence.

The simplest explanation might seem to be that she is in fact, as she claimed and as Dr. Cay claimed, a Tuvela-Guardian. But that confronts us with the other question of why a Guardian should reveal her most secret identity and expose her group to the enemy. To that question there is no reasonable answer.

Further, I see no room in the structure of the Federation's Overgovernment for a class of hidden rulers. It is a multilayered complex in which the Federation Council, though popularly regarded as the central seat of authority, frequently appears to be acting more as moderator among numerous powerful departments. That all these organizations, led by very capable beings, should be the unwitting tools and pawns of Tuvela-Guardians may not be impossible but is highly questionable.

Therefore, I say we should not accept the possibility that Dr. Etland is a Guardian as a satisfactory explanation. I ask the Lord Ildaan to poll the Committee.

THE LORD ILDAAN: I poll the Committee and the Committee agrees. The Lord Toshin will resume comment.

THE LORD TOSHIN: The second possible explanation is that Dr. Etland, while not a Guardian and not in the Parahuan sense a Tuvela, has paranormal abilities and employed them to terrorize the invasion force to the point of precipitate retreat. I refer to what is known as the Uld powers. To this, I can say only that there is nothing in her record or reputation to indicate she has such abilities. Beyond that, lacking sufficient information on the human

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use of Uld powers, I shall offer no opinion.

THE LORD ILDAAN: The Lord Gulhad will comment.

THE LORD GULHAD: At one time I made an extensive investigation of this subject in the Federation. My purpose was to test a theory that the emergence of a species from its native world into space and the consequent impact of a wide variety of physical and psychic pressures leads eventually to a pronounced upsurge in its use of Uld powers. The human species, of course, has been in space for a very short time in biological terms. Because of the recent acute disturbances in its political history, I was unable to obtain confirmation of the theory. The available records are not sufficiently reliable.

However, I could establish that the humans of our day make use of Uld powers more extensively than most other intelligent species now known to us. Humans who do so are called psis. There is little popular interest in psis in the Federation and there is considerable misinformation concerning them. It is possible that several branches of the Overgovernment are involved in psi activities, but I found no proof of it. It is also possible that the Federatios has advanced the nonbiological harnessing of Uld powers to an extent considerably beyond what is generally known, and is, therefore, relatively indifferent to its usually less exact control by living minds.

The question is then whether Dr. Etland, either directly or with the aid of Uld devices, could have used Uld powers to produce the disconcerting manifestations reported to the Committee by the Lord Mingolm. Did she incite normally harmless lower life forms to attack the Parahuans? Did she make herself invisible and generally untraceable? Did she cause opponents to disappear, perhaps into the depths of the sea, into space—even into dimensions present unknown to us? Did she madden the minds of the Voice of Action, forcing them into their disastrous revolt? Was the explosion of the two submerged ships which triggered the abrupt retreat brought on by a manipulation of Uld powers?

All this is possible. We know or suspect that human psis and other users of Uld have produced phenomena which parallel those I listed.

However, it is improbable. In part because there is no record that any one Uld user could employ the powers in so many dissimilar ways. Even if we assume that Dr. Cay was also an accomplished psi and that the two worked together, it remains improbable.

It is further improbable because we cannot say that Dr. Etland could have achieved what she did only through the use of Uld power. Considered individually, each reported event might have had a normal cause. And since the deliberate control of Uld to a significant extent re-

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mains exceedingly rare also among humans, its use should not be assumed when other explanations are available.

THE LORD ILDAAN: I poll the Committee and the Committee agrees. The Lord Toshin will comment.

THE LORD TOSHIN: There remains, as the Lord Gulhad indicates, a third possibility. I find it perhaps more disquieting than the two we have considered. It is, of course, that Dr. Etland is precisely what she seems to be—an exceptionally capable human, but one with no abnormal qualities and no mysterious authority. Our investigation indicated that she is thoroughly familiar with the floating forests of her world and the life forms to be found there, is skilled with weapons and on a number of occasions has engaged successfully in combat with her kind. Dr. Cay was a Parahuan captive long enough to have gained detailed information on the Tuvela Theory. It is difficult to see how he could have transmitted this knowledge to Dr. Etland. But if we assume he found a way of doing it, it seems we should accept, as the most probable explanation of the events reported by the Parahuan survivors, that Dr. Etland used the information and her familiarity with the area and its tactical possibilities, along with physical competence and technological weapons, to demoralize and rout the enemy.

Of course, we cannot prove this. And evidently that is precisely what the Federation's Overgovernment intends, in seeing to it that no mention was made of Dr. Etland's role or the Tuvela Theory in the accepted reports on the Parahuan invasion. Any investigators who were aware of the Parahuan version of the affair would know something was being concealed but could only speculate, and perhaps speculate uneasily, on what was concealed. For note that it is not of major significance which of the possibilities considered here contains the answer. To an enemy, the individual we know as Dr. Etland would be as deadly in one aspect as in another. We should regard the silence of the Federation's authorities on the point as a warning directed to those who might base their actions on too definite a conclusion—such as the one made by Porad Anz. It implies that a hostile intruder cannot know in what shape disaster may confront him among humans, that if he comes he will face the unexpected—perhaps the uncalculable.

My own training as a military weapons specialist leads me to certain conclusions which cannot be proven, but merit weighing in consideration.

First, in the most general sense, a "weapon" is any system, device or entity which has military effect. In this general sense, Dr. Etland is a weapon—and a weapon which, alone, demonstrated greater mili-

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tary effect than the Parahuan Expeditionary Force.

Her activities were characterized by great mobility and agility. She evidently used highly compact, portable weapons—in the more usual sense of technical devices. Repeatedly she made contact with fully armed and alerted Parahuan patrols, and without exception the patrols suddenly, silently vanished. Whatever personal weapons she employed—whether based on Uld forces or otherwise—must be recognized as representing an extremely high military technology. The psychological effect of those swift, silent vanishments was so great that it tends to distract our attention from the purely physical weapon technology implied.

Finally, the equally sudden and silent vanishing of the gigantic tarm suggests strongly something far more deadly. Our present technology knows of no portable hand weapon which can be expected to allow a single individual to survive an encounter with a tarm; self-propelled heavy weapons would be required. However Dr. Etland destroyed two tarms with some very compact weapon—but more significant is the total vanishment of many tons of dead flesh. In neither instance were the Parahuans able to find any trace of the tarms, nor any area showing application of forces competent to destroy that sheer mass in the very limited time.

We cannot establish whether Dr. Etland was or was not a "normal" human female—though if that is "normal," the race is equipped with a very large number of exceedingly dangerous weapons. But we are forced to observe that she used some device so small as to be no impediment in her swift movements, yet so powerful as to completely dissipate a giant tarm.

Such a weapon implies a level of weapon technology of a completely new order.

It then becomes quite clear that the two Parahuan ships that "escaped" were, in fact, sent home to report. I wonder as to the effect of a ship-borne scale-up of that hand weapon.

THE LORD MINGOLM: Still we must reach decisions as to action. We have established only that Dr. Etland was a dangerous individual. What information does the Parahuan mistake give us about the species?

THE LORD TOSHIN: It confirms that the species is extremely variable. The Parahuan evaluation was based on the study of a few thousand individuals, plucked secretly from space over a long period of time and tested to destruction. No doubt Porad Anz learned a great deal about these humans in the process. Its mistake was to generalize from what it learned and to calculate from the generalizations. To say that *the* human is thus and so is almost to lie automatically. The species, its practices and philos-

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ophies remain unpredicatable. Individuals vary, and the species varies with circumstances. This instability seems a main source of its strength. We cannot judge it by what it is today or was yesterday. We do not know what it will be tomorrow. That is the cause of our concern.

THE LORD ILDAAN: It is, indeed, the cause of our concern. And it seems from what has been said that the human Overgovernment must be considered now as a prime factor. The Lord Batras will comment.

THE LORD BATRAS: The function of the Overgovernment is strategy. In part its strategies are directed at the universe beyond the Federation. But that is a small part.

Regard the Federation as the object of an invader's plans. It covers a vast area of space. Its inhabited worlds appear almost lost among the far greater number of worlds which support no human life. Below the central level, its political organization seems tenuous. Federation military power is great but thinly spread.

The area of the Federation would thus appear open to limited conquests by a determined and well prepared foe. But we are aware that during many star periods every such attempted thrust has failed. We have seen more subtle plans to weaken and cripple the human civilization fail as completely, and we still do not know specifically why some of them failed. However, on the basis of what we have observed, we can say, in general, now that the Federation is a biological fortress armed by the nature of its species. The fortress may be easily penetrated. When this occurs, it turns into a complex of unpredictable but always deadly traps.

This being true, we must ask why the Overgovernment persists in acting in a manner which appears almost designed to conceal the strength of the Federation's position. We have seen that its policy is to treat hostile activities as being of no importance and that it provides its own people with no more information concerning them than it can avoid. We may assume it genuinely believes its present galactic neighbors do not constitute a serious military threat. However, the great restraint it shows in retaliating for planned attacks must have a further reason. In the latest instance, it has not even forced Porad Anz to disarm, as it easily could have done.

I believe we have amassed sufficient information at last to explain the matter. The Overgovernment's main concern is with its own populations. What plans it has for the species we do not know. As yet, that defies analysis. But we know what plans it does not have for the species and the means it employs to keep it from turning into directions regarded as undesirable.

Consider the creature again as

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the Lord Toshin described it. Individuals vary in attitude and behavior, but the creature as a class is eminently dangerous. It is, of course, inherently aggressive. Before the structure of the Federation was forged, humans fought one another for many star periods throughout that area with a sustained fury rarely observed in other species. Since that time they have remained technically at peace. But the aggressive potential remains. It expresses itself now in many ways within the confines of the human culture.

I said that we know what the human Overgovernment does not want. It does not want its unstable, variable, dangerous species to develop a philosophy of space conquest from which it could gain nothing it does not already have, and through which it might return eventually to the periods of interhuman conflict which preceded the Federation. Possibly the Overgovernment is influenced by additional considerations in the matter. We do not know that. We do know that the human species is oriented at present to deal with other intelligent beings in a nonhostile manner. There are criminal exceptions to that rule—we and others have clashed with them. But those exceptions are regarded as criminals also by their kind.

This general attitude could change if the present humans of the Federation gained the impression they were being seriously challenged by outside enemies. So far, they have been given no reason to believe it. The Parahuan invasion was a serious challenge only in the minds of Porad Anz. We anticipated its failure but believed we could gain information from it—as we have done.

I submit to the Committee that we now have gained information enough. The human Overgovernment has shown it is afraid of the effects continuing irritations of the kind might have on its species. We, too, should be wise enough to be afraid of such effects. If the Federation is launched on a pattern of retaliatory conquests, the pattern might well become an established habit. That is the real danger.

THE LORD ILDAAN: The Committee agrees. I speak then as the Lord Ildaan, representing the Alliance of the Lords of the Sessegur, Chiefs of the Dark Ships. I address the Wirrollan delegation and all those they represent. To the ends of the area through which the influence of the Alliance extends there will be no future hostile action prepared or planned against the human Federation. The Alliance forbids it, and the Dark Ships enforce our ruling as they have done in past star periods. Be warned!

The Committee concurs. The meeting is closed. ■

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FUNNY COINCIDENCE

BY JOHN H. POMEROY

1949 "We have recently been exceptionally fortunate in our study of high energy particles in having the use of the recently-completed billion-volt octotron. This "atom-smasher," as it has been called in the popular press, works on the principle that instead of having only one circular orbit, as in the betatron and the synchrotron, *two* circular orbits are produced in the Siamese-twin assembly of accelerating fields. When these two circular fields intersect tangentially, the compelte orbital pattern is that of a figure "8," from which the name "octotron" was derived . . . By the usual methods of vectorial deletion, it may be seen that because of the moving frame-of-reference system of the two intersecting beams, remarkably high-energy particles may be produced . . ."

"Progress Reports," by John H. Pomeroy, ASTOUNDING SCIENCE-FICTION, September 1949, p. 34.

1966 *"Construction begins this summer on a site for a new type of sub-nuclear research* by the European Organization for Nuclear Research (CERN). Located on a two hundred acre site straddling the Swiss-French frontier in Meyrin, Prevessin, and St.-Genis-Pouilly, the tunnel will house two interlaced rings of four hundred magnets with an average diameter of three hundred meters. The rings will "store" protons for use in colliding-beam experiments designed to give fundamental information about the structure of matter and the nature of chemical reactions. When the project is completed in about six years, a pulse of 1×10^{12} protons will be fed into one of the rings. By "stacking" more pulses, it may be possible to achieve a collision rate of about 100,000 per second."

Item in Research Concentrates, CHEMICAL AND ENGINEERING NEWS, August 8, 1966, page 31.

Hm-m-m. Wonder what took them so long?

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P. Schuyler Miller

MORE FROM THE SOVIET

Two more hardback anthologies of Soviet science fiction support the conclusion that the Russian offerings are still at the stage English and American SF passed through in the Twenties and Thirties, but they raise just as many questions about the editors as about the authors and the state of the art.

The Collier paperback collections, recently reissued with new covers, were actually American editions of English-language anthologies published by the Soviets. Then, in 1964, we had an anthology edited by Robert Magidoff, head of the Department of Slavic Languages and Literature at New York University. In principle, he should have been in a position to make his own choice of the best Soviet science fiction published in Russian books and magazines. Translations were made especially for the book by Helen Jacobson, a teacher of Russian. For the most part, the stories selected were cruder and duller than the ones the Russians had selected.

Now Professor Magidoff has assembled and Miss Jacobson has translated a second anthology, "Russian Science Fiction: 1968" (New York University Press; 1968; 211 pp.; $6.50) which purports to bring together "the liveliest and best-written short stories" now being written. At almost the same time another relatively new publisher has brought out an anthology of "the best new science fiction from the Soviet Union" edited and translated by Mirra Ginsburg, "Last Road to Aiya" (S.G. Phillips, Inc., New York; 1968; 192 pp.; $4.95). It is hard to escape the conclusion that Miss Ginsburg knows a good story when she reads one and Professor Magidoff doesn't. Alternatively, Miss Ginsburg can translate a story into readable English—her translations of top Russian and Yiddish authors have been published in many American magazines—and Miss Jacobson can't. Unless you read Russian, and can get hold of the original stories—and neither editor gives the sources—it is impossible to decide which conclusion is correct.

The thirteen stories in "Russian Science Fiction: 1968" are a little better than in the 1964 anthology; Professor Magidoff points out that in that volume he was selecting "landmarks" to show the development of Russian science fiction, not for entertainment values. Even so, the titles read like American magazines of the Nineteenth Century: "The Heroic Feat"—which also reads like a Victorian homily; "Tales of the Distant Past;" "A Dweller in Two

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Worlds;" "The Founding of Civilization." There are only a few stories which might merit reprinting in our contemporaries, *Fantasy & Science Fiction* or the new *International Science-Fiction*— which has had some of them, though not the ones I would choose.

The best of the lot is "Storm," by Valentina Zhuraleva, an M.D. It has a good, legitimate base in the medical application of electronics, it offers us a deftly painted portrait of the wheeler-dealer medical researcher—evidently even the Russians have them, and its plot hangs on a valid scientific issue. My second favorite is totally different, the delightful series of misadventures of an *enfant terrible* of the Twenty-first Century, "Life is So Dull for Little Girls," by Kirill Bulychev. Alissa makes friends with a newly hatched brontosaurus, blunders into a great discovery on Mars, rescues a Japanese ghost, and finds the lost embassy from Labutsil, the first extraterrestrials to reach Earth. She does it all naturally and charmingly.

Some satire is apparently getting by, too, in the post-Stalin era. Vladlen Bakhnov's "The Robotniks" needles the current worldwide teenage revolt against the Establishment: the activists have shaved their heads and talk, walk and act like robots, while . . . but that is the story. And "Mutiny" by the same author carries the metaphor a step farther with its picture of a world where even the machines have learned that conformity is safest. *International S-F* has reprinted one of the three humorous vignettes by Ilya Varshavsky, "In Man's Own Image," which deal with personality conflicts between men and robots. And "Formula for the Impossible," by Yevgeny Voyskunsky and Isai Lukodyanov, journalist and engineer respectively, is an Analog-type story about a very strange planet, rather clumsily written. (But compare the translations in the NYU collection with those of the same stories in *International S-F*. Maybe Professor Magidoff should get a less pedagogically oriented translator.)

"Last Door to Aiya" is a far more enjoyable book. The title story by E. Parnov and M. Yemstev and "The World in Which I Disappeared," a free-wheeling satire on the computerization of sociological planning by Anatoly Dneprov, a Russian cyberneticist, have been reprinted in *International*, but the best in the book is "Homer's Secret," by A. Poleshchuk—a story which unites the "two worlds" of science and classical *academe* in a smooth and believable way, as time travelers go back to discover the real Homer. This one should get into more anthologies. "The White Cone of the Alaid" by the science fiction writing brothers, Anatoly and Boris Strugatsky, is another good one by a dependable team; I'm at a loss to know why Magidoff passed them up, though it may be

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because their stories are in the English-speaking tradition and he may not consider them adequately Russian. It introduces the new and useful concept of "embryomechanics" to science fiction in a forceful way. "Last Door to Aiya" is also a story which would not have been out of place in Astounding in years past.

The U.S.S.R. is an enormous country in whose unexplored Asiatic fastnesses it is not impossible to conceive of fertile brontosaurus eggs or the miraculous "Golden Lotus" in a story by M. Grishnov—a type of story that has its place in the early years of American and British SF (it's the "Lost World" gambit, of course) but which we have transplanted to the wonderful and horrible worlds described by writers like Andre Norton. Perhaps because it was frowned upon by Stalinist circles, science fiction has been a late starter in Russia and still lacks the internal disciplines developed by English and American writers. As we did a generation ago, the writers represented here rely on hyperbole—on writing in a sustained shout—rather than on "hard" science. In the otherwise enjoyable exploits of time-traveling "Vanya," wholly rhetorical sparks fly under a Paleolithic cave artist's flint graver, and in "The Founding of Civilization," by R. Yarov, the cave men who have not learned to make fire still have writing; this carelessness ruins an otherwise original story of time traveling as a sport.

I'm not sure we know even yet what good Soviet science fiction is, but Mirra Ginsburg seems more likely to show us than Professor Magidoff.

CRYPTOZOIC!

By Brian W. Aldiss • Doubleday & Co., Garden City, N.Y. • 1968 • 240 pp. • $4.50

When Brian Aldiss cuts loose in Time, you'd expect the results to be out of the ordinary—and so they are. What happens to Edward Bush in his mental peregrinations through various levels from the Devonian to Queen Victoria's palace can be read as a psychedelic "trip," as a never quite consistent chain of hallucinations . . . or as real. The total effect is certainly nightmarish, but never quite as real as the nightmares that the author's fellow-countryman, J. G. Ballard, weaves and embroiders.

At times Bush is hunted by obscurely identified enemies; at others, he is the hunter. We are shown a universe in which ghostly outposts have been established throughout past millennia, and in which tourists and explorers play out their own obscure and intricate games. There is the Dark Woman who haunts Bush in every era; there is the future hippie, Ann; there is the pseudonymous Stein, a bystander in the Devonian, a savage attacker in the Jurassic, a fugitive from the tyrants of the Present . . . and a scientist who believes he can

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prove that Time really flows counter to the direction we accept, that our "past" is actually the future and that Man is devolving as entrophy shrinks and energy flows from cold to hot until the universe vaporizes into a seething plasma.

I have yet to see a successful reverse-Time-flow story, and this is no exception. But the book will still grip you and annoy you.

THE ESKIMO INVASION

By Hayden Howard • Ballantine Books, New York • No. U-6112 • 380 pp. • 75¢

This strange book is going to be one of the contenders for best SF novel of 1967. It ran in *Galaxy* as a series of short stories and novelettes, but the joints don't show and it may be that the complete book was written first and sliced up for magazine publication. (There are no prior copyright credits.)

We enter the story in 1989 or '90 when Dr. Joe West, University of California population expert, is smuggling himself into the Eskimo Cultural Sanctuary which Canada has established on the west side of Hudson's Bay in 1970—the one major improbability of the story. Here a small band of Eskimo have been sealed off and forced to relearn their ancient adjustment to the arctic environment. But the Eskimos are breeding like hamsters, and West soon comes to the conclusion that they are a new human species which can breed the rest of mankind right off the face of the planet.

Trying to get some kind of accommodation for his Eskimo friends in the face of governmental and scientific bureaucracy, trying to fit his perpetually pregnant Eskimo wife into the faculty community in Berkeley, trying to unravel the truth about the "Esks" and their fantastic biology, and finally, dropped into Red China, trying to find out how Mao III intends to utilize the breeding potential of his Esk slaves . . . these and other diversions keep Joe West and the reader extremely busy. The plot plunges, bucks, turns back on itself. Marthalik, West's Esk wife, is built into a real person—then discarded, halfway through the book. Other freeways of action are simply abandoned. But it's still effective.

LORDS OF THE STARSHIP

By Mark S. Geston • Ace Books, New York • No. G-673 •156 pp. • 50¢

This strange story by a new young writer—still in college in Ohio—has been nominated for the Nebula "best novel" award of the Science Fiction Writers of America. I don't know how hot the competition is—I haven't managed to read all the contenders—but it is an extremely good first book.

In some ways, and not just because of Schoenherr's cover, the book reminds me of Frank Herbert's "Dune." Its setting is Earth, or a new Earth, in a future long

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after a human civilization has reached the stars—then smashed itself in planetary war. Feudal and barbaric remnants of humanity hang on in habitable pockets, among mutant monsters and the crumbling relics of ancient greatness. The little Caroline Republic is one of the most promising of the bits and tatters, but the vigor seems to be draining out of it. So a moribund general gives them a Cause—to restore past glory that has become merely myth to most, and build the gigantic Starship for which plans and materials lie waiting in the "Yards" at the mouth of the River Tyne.

Then, as the plan evolves, flaws and distortions begin to appear in it . . . or have they been built into it? There are schisms among the builders. Individual ambition must be satisfied. What has seemed simple becomes maddeningly complex. And you—and they—begin to wonder who is really planning the Starship.

It's a book that would have been a "classic" if it had been written in the "good old days." Standards are higher now, but it meets them head-on.

THE AMSIRS AND THE IRON THORN

By Algis Budrys • Gold Medal Books, New York • No. d-1852 • 159 pp. • 50¢

We haven't had a Budrys book in a long time, and although this is no second "Rogue Moon," it will do until he matches that unforgettable novel.

I don't know whether I'm bright, or whether the reader is intended to gradually work out for himself what and where the strange world of the Amsirs and the Honors is located. I suspect the latter. It's subtly done, with the clues slipped in here and there through a barrage of strange phenomena, values, images and events. For me, the last third of the book, where Honor White Jackson rediscovers Earth, is anticlimactic: his own world—the world of the Thorns—is far more interesting.

What the Thorns are is never quite explained. Grounded spaceships . . . terraforming towers . . . whatever they are, they are incredibly ancient and the people who live in their umbra of atmosphere and energy are very, very strange. The elite of Honors and the drudging Farmers are recognizably human, but the society they have evolved is bizarrely adapted to the grim conditions of their life. The Amsirs, birdlike giants whom they hunt for food and status, are obviously inhuman but uncomfortably humanoid. And so, when White Jackson hunts his Amsir into the desert, and sees it turn on him with a javelin, and hears it talk, all hell breaks loose.

Jackson isn't the first; other Honors, including his brother, have had the same experience. It is part

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of their rite of passage into warriorhood, the elite of the tribe. But White Jackson is a strange, difficult kind of person, so he doesn't react as the others did. He goes back into the desert and surrenders to an Amsir . . .

This ought to be in the finals for somebody's award for best of 1967.

THE ZERO STONE

By Andre Norton • Viking Press, New York • 1968 • 286 pp. • $4.50

Andre Norton's annual hardback science-fiction book, though nominally juvenile, always keeps me on edge for months. Her publishers don't send out review copies—not to me, anyway—and I first have to find out what the book is, when it's coming, and start a kind of horse-race among the Pittsburgh bookstores to see who will get it first. It's always worth the tension. Ace doesn't put you through this kind of wringer for her original paperbacks, praise be!

This book is evidently the first of a series, because it opens a number of questions that are by no means answered at the end. It is, of course, one of Miss Norton's delights that she *doesn't* feel she has to cram all the answers into the last six pages. It is also pleasant to note that with each book she sets in her self-consistent future of the Thieves' Guild and the Free Traders, she fills in her picture of that far future with bits of detail and background information. This time, in passing, we learn of the tradition that there were three great space-faring empires in the galaxy before the reptilian race that came before Man's own expansion among the stars. We have seen glimpses of these ancient races in other books, and we see more here.

Murdoc Jern, apprentice gem trader, has to run for his life from the priests of a trivial world as the story opens. Why he and his master have been selected for sacrifice is one of the mysteries that are slowly resolved. He finds sanctuary, buys his way off-world, picks up a strange companion and a hideous illness, escapes before he can be dumped into space or marooned on an airless rock, and winds up on a hostile forest world with ravenous natives, the Thieves' Guild, and the Space Patrol all zeroing in on him and the ring he has inherited from his foster-father.

Star of the book, though, is Eet, an extraterrestrial creature which appears as a stone, is eaten by a ship's cat, gets itself reborn as a non-kitten, and promptly takes over the care and management of Murdoc's life. A powerful telepath, with an assortment of other powers, Eet is evidently patterned on a similarly domineering creature in the books by A. M. Lightner, to whom this one is dedicated. If and when we find out what Eet really is, the two critters just might turn out to be of the same breed.

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"The Zero Stone" isn't quite as fantastically rich as Miss Norton's "Janus" books, and the plot is less compelling, to me, than those of some of her "Time Traders" yarns. Nevertheless, I think she's smart to keep adding eggs to her basket rather than working at one series until she and her readers are bored with it. She can always come back with a fresh point of view.

BEST SF: 1967

Edited by Harry Harrison & Brian W. Aldiss • Berkley Books, New York • No. S-1529 • 256 pp. • 75¢

We are acquiring a bewildering number of "best" annuals. Judith Merril's have been going for years, growing further out with every swing. Ace launched a "World's Best" three years ago. And now Harry Harrison and Brian Aldiss are putting their act on. Like Judith Merril, they interpret "SF" as "speculative fiction" and include such things as Harlan Ellison's much-reprinted yarn about a hunted slot machine, "Pretty Maggie Moneyeyes," and J. G. Ballard's totally unclassifiable "The Assassination of John Fitzgerald Kennedy Considered as a Downhill Motor Race," which seems to be only part of some more extensive surrealist opus.

Even for conservatives, though, this is a good one. Robert Silverberg, who grows steadily better in both fiction and nonfiction, opens the book with "Hawksbill Station," the story of a prison camp isolated deep in the Cambrian. Apart from the ostensible plot, about a very peculiar new prisoner, this one says something about the kind of people who spend their lives in jail. C. C. Shackleton, in "Ultimate Construction," has the kind of short-short that Fredric Brown used to write, about the last man on Earth—with a snapper ending. John T. Sladek's "1937 A.D." isn't much longer, and does things to the alternate time-track theme that shouldn't happen to such a venerable old stereotype.

Ben Bova is another writer who has been getting steadily better since he started with juvenile science fiction several years ago. "Fifteen Miles" is an endurance-on-the-Moon story that gives the book some variety, but won't be remembered long. Fred Hoyle's "Blackmail" is from the astronomer-science fictionist's short story collection, "Element 79," just reprinted as Signet No. P-3463 for sixty cents. It's just about the best in that lot—a sharp little comment on the television generation. And Kit Reed, in "The Vine," has a parable of human values very similar in tone to some of Shirley Jackson's cruelly memorable stories, such as "The Lottery."

James Thurber's classic "Interview with a Lemming" fits the sharp-toothed mid-section of the book very well, though it is by no means a 1967 story. No matter; maybe you've never encountered

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this aspect of Thurber's wit.

With Frank M. Robinson's first SF in a long time, "The Wreck of the Ship John B," we are back in a more conventional stream. This one has a theme: "Any environment that doesn't require a man to do something is a hostile environment." Think about that one a while—and look around you. Seaman A. Bertram Chandler has another wreck story in "The Left-Hand Way"—not one of his "Rim" series, but set in the same universe. The first three pages promise that it's going to be one story . . . then it changes direction completely.

"The Forest of Zil," by Kris Neville, is another that you're not going to cram into a pigeonhole easily. A mood bit: maybe fantasy in the Dunsany manner, maybe suggestive science fiction. You decide. Fritz Leiber's "Answering Service," on the other hand, is far from fantastic: a grim little vision of the cruelly old and mad. Keith Laumer's "The Last Command" is as far from his "Retief" comedies as you can get; the editors comment that it is a typical Analog story, and so it is—and was.

Finally, Gary Wright's "Mirror of Ice" is that rarity in science fiction, a *good* sports story about a new form of sledding in the future.

I should have said that James Blish introduces the book and the series with a brief credo for SF anthologies. This one ignores him in some respects. It's still very good. The competition for the best "best" is going to be hot.

Recent Reprints and Reissues

VICTORY ON JANUS

By Andre Norton • Ace Books, N.Y. • No. G-703 • 190 pp. • 50¢

The second part of Miss Norton's saga of the green people of Janus and their war with unimaginable powers. There's more to come, and you should read it all, beginning with "Judgment on Janus" (Ace F-308).

THE WITCHES OF KARRES

By James H. Schmitz • Ace Books, N.Y. • No. A-13 • 286 pp. • 75¢

Another grand yarn with no counterpart in all SF.

THE TIME MACHINE

By H. G. Wells • Bantam Pathfinder Books, N.Y. • No. FP-4063 • 115 pp. • 50¢

Still another edition, with an attractive cover—one of a series for young people.

THE NOT-MEN

By Jack Williamson • Tower Books, New York • No. 43-957 • 222 pp. • 60¢

Reissue of the paperback edition of the book originally published as "Dragon's Island."

THE "LOMOKOME" PAPERS

By Herman Wouk • Pocket Books, N.Y. • No. 75226 • 113 pp. • 75¢

Special illustrations and a special appreciation hardly justify the extra price for this paperback edition of a pretty poor SF by a good writer. "Lomokome" is Hebrew for "utopia," he tells us.

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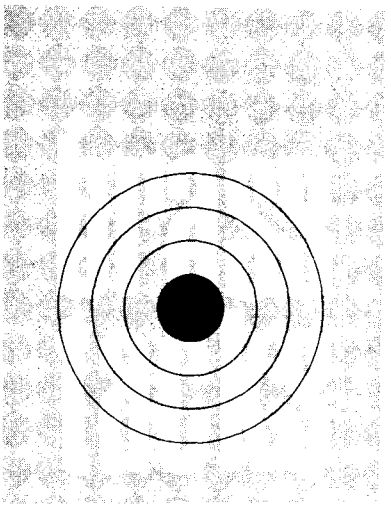

Dear Mr. Campbell:

When reading the recent adventure story, "The Horse Barbarians," I was both startled and delighted to find yet another instance where a hero is portrayed. For it is a rare and uplifting experience to see man depicted in literature as courageous, proud, and intelligent.

Harry Harrison presents, in the person of Jason dinAlt, a supremely competent being brilliantly fighting for those values to which he is passionately dedicated. For Jason—as for his counterpart in Greek legend—life *means* achieving.

My compliments to Mr. Harrison on writing such a story; and to you for your intelligence in recognizing it worthy of publication.

LAURENCE I. GOULD
30 Glenbrook Road, Apt. 1H
Stamford, Connecticut 06902

I am myself a bit fed-up with the anti-hero approach in modern literature"!

Dear Editor:

The April issue of Analog was one of your best except for one discrepancy: there wasn't any science article. Nor in the March issue. The science articles are one of the important factors that make the magazine more interesting than the other science-fiction magazines and I, for one, feel robbed when I get an issue without one.

In Brass Tacks a letter from one Mr. Saklad damned smoking and some other things. You answered it by saying, "South Africans are the world's heaviest smokers of cigarettes, with Australians second. Yet South Africa and Australia—settled from England—have a far lower lung cancer rate among heavy smokers than England has among nonsmokers!" Would you print the statistics and or their source? (I know you're not a lying charleton but someone I'm arguing with on the subject doesn't.)

The facts do bring up a mystery, however. If pollution is the cause of lung cancer, why is there a higher cancer rate among smokers in America, than among nonsmokers? I think it would be fair to say

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that the combination of air pollution and smoking creates a high susceptibility to lung cancer. In recent years there have been some organized publicity attacks on both air pollution and smoking. The attack on cigarette smoking is, for some reason that I can't fathom, doing a lot better.

People must consider air pollution, which has shown no good effects whatsoever, more beneficial than smoking. (The only worthwhile thing I've seen for smoking is a button that says SURE I SMOKE . . . IT'S SAFER THAN BREATHING!)

Alex Krislov

3694 Strandhill
Shaker Heights, Ohio 44122

My data on the incidence of cancer among southern hemisphere residents came from a South African medical journal. I get floods of clippings, abstracts, and odd bits of information, and I simply can't keep track of 'em all. Sorry, I can't give a bibliography.

As to the lack of articles: I plan to publish one good science article a month. And if no good article comes in, why our primary function is fiction and I'll be darned if I'll publish a poor article just to have one in!

Dear Mr. Campbell:

Congratulations on thirty years —three hundred sixty issues—of editing Astounding-Analog as of the February 1968 issue. Should these be extended to Kay Tarrant? The earliest mention I can find in my Astounding of her name is in October 1942. Is it possible this cryptic figure is the real mastermind behind Astounding-Analog?

My only disparaging comment about these thirty years is that the trend in cover-art you seem to be following is a poor one. You seem to be encouraging a lack of clarity and distinction in the covers for the past few years—with exceptions, of course. I suggest a return to cover-art as exemplified generally by those of the 1957 and 1958.

BRIAN E. EMERICH

2204 E. White Lantern Lane,
Orange, California 92667

You know, you're right. Kay Tarrant runs the magazine—all I do is sit around and read stories and have bull sessions with authors. And she's been running it since 1938, actually.

Dear Mr. Campbell:

This has nothing to do with anything in particular, but I thought you might be interested.

The "Alternate Worlds" stories have been, more or less, "done to death." I'd like to put it away permanently.

1. On some of these alternate worlds the inhabitants are certainly aware of other Hernate worlds.

2. On some of these the population may have a mass psychosis.

3. On some of which this psychosis may be a form of paranoia result-

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ing in a desire to destroy all other alternate worlds.

4. On some of these they can and do. Period. End of a Sub-genre.

So, if all possible worlds can exist they don't.

Thank you.

GERALD SHIFRIN
1448 Neil Avenue
Columbus, Ohio

Wrong! Alternates with that degree of paranoia destroy each other before they achieve interdimensional technology!

Dear Mr. Campbell:

I suppose your March editorial on dowsing will draw plenty of comment, since the subject seems to be controversial.

When I encounter an unusual ability or practice, I first start to wonder, "Would it work for me?" If I am interested enough, I usually find some way of trying it out for myself, especially if there is an indication that it could have some practical use.

Dowsing is a very simple thing to check out. It takes a minimum of equipment, and there is such a variety of ways it can be applied that one close at hand could easily be found.

Quite a few years ago, my husband noticed some workmen on a job using ⅛" brazing rods as dowsing rods, to locate pipes under a paved road. When he told me about it and found I was interested, he got two rods and bent them, and we've used them on our property at various times through the years, to locate electrical conduit, water pipes, underground surveyor's pipes on the property line, or any other specific thing we need to find that is underground. It works for both of us. We had first approached the use of rods already knowing that they worked for other people.

There are some people we know who do not believe in them, and they got no results. One friend of ours said he knew that there was some underground water pipe on his property and that he could make use of it if he knew just where it was but it would be quite a job to locate it. We told him about the dowsing rod method and he ridiculed the idea at first. Later, he said he was sure it wouldn't work for him. We offered to show him how but he didn't want to handle the rods. We even said we would try to locate the pipes ourselves and he would not let us. He seemed actually afraid to have anything to do with the subject of dowsing.

Somewhat along this same line, we had another strange experience. We had two heavy-powered horseshoe magnets here at the house. Playing around with them one time when our children were small, we showed them how strongly they were attracted to each other when held (one in each hand) with poles opposed, and how you could hardly even force them together when turned the other way. The children

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tried it and their expressions of amazement amused us.

An elderly neighbor watched all this and seemed fascinated. We asked her if she'd like to try it and held out the magnets toward her. She jumped back and refused to handle the magnets at all. In fact, she was so afraid of the whole procedure and became so upset that we had to put them away. She would give no explanation as to why they worried her.

This brings me to the second question and I often wonder about it. *Why* are some people so fearful and upset when confronted with something they do not understand? Why is there such a *resistance* to the idea of investigating it? What fears must lie deeply buried? Why shouldn't anyone feel free to investigate anything about which he felt curious?

I can understand why many people would hesitate to involve themselves in practices which were against the law. Also, there is good reason in being cautious about trying something that could have an irreversible bad effect on the mind or body. But what could be so frightening about holding a couple of welding rods in your hands?

There must be powerful forces preventing some people from allowing themselves to follow up an interest in any unusual ability of human beings. There is something bothering them, for they either protest too much or they show a studied lack of interest even when such an interest would be normal.

The third question that comes to mind whenever I consider unusual phenomena for which there does not at present seem to be a scientific explanation is "What could be a *possible* explanation of how it works?" If you take a negative approach, it is very easy to find something to say about why it would not, or could not work. However, this is a lot less productive of information than asking how, when, where, for whom, and under what conditions it could or does work.

In respect to dowsing, my answers to the above questions may not agree with all others who have an opinion on this subject—and I hope someday to have better answers that are closer to the truth—but here they are, for now.

How might it work? It could be that in going through the motions of walking around, the dowsing rods of some sort in your hands, and a question in your mind, you are setting up *a condition wherein your body becomes a receiving instrument.* Dowsing seems to be a method of signaling the awareness, or amplifying a signal that ordinarily would not be strong enough, for the purpose of discovering specific hidden information.

The body definitely is receiving some message. The reception is not powerful enough to affect it in any noticeable way without some means of amplification. It needs some

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piece of additional equipment whereby an imperceptible nudge of a muscle could cause a larger movement that would be felt and visible. The long end of this rod will swing very easily. It can be seen and felt as it starts to swing, and yet I do not feel conscious of the fact that my muscles are doing this work, or that I am deliberately causing the rod to move. I do believe that some part of me *is* causing it.

Where does this message originate? It could start in any one of a number of places. If the position of the pipe—or whatever is being sought—had been previously known to you, but forgotten, then there could be a memory search, plus the stimulation of a muscle at the correct moment. Both of these actions could be carried on subconsciously.

If the information sought was never known consciously by the dowser, then it could be picked up from another mind that did have the information, by means of telepathy. If the information was not now in any person's memory bank, then it could be a direct subconscious contact with the object of search, through psychometry. It could even be some combination of any or all of these methods. I have heard many other "explanations"—some reasonable sounding, some mysterious, some wild, et cetera. Who is to say just what the true explanation will turn out to be—but it's fun to try to find an explanation that fits the facts and this just may be tied in with the "reason why" humans do seem to be able to do some of these unusual and sometimes unexpected things. It has been said, "Ours is not to reason why . . . et cetera." I say, "Why not?" The reasons given for "not reasoning" usually do not seem reasonable to me!

When will dowsing work? When it is needed, it has worked for me. I haven't done much experimenting with it, except when I had a need for it. I'd like to hear how others make out who do dowsing just for the sake of experimenting with it, but not with any real need of it.

For whom will it work? For those who give it a chance to work, by "letting it work." Many people would not let themselves get involved in dowsing in the first place. Others, even if they went through the motions, would not let the rod move. It would be very simple to keep it from moving.

When I first tried dowsing, at the first almost inperceptible movement, I had a tendency to try to control the rods. It is necessary to become conscious of the movement, and do nothing to stop it. Disbelief, fear, or other strong emotions could cause you to stop the rod. This could even happen at a subconscious level, and then you would not be aware of the fact that there had been any response at all.

Under what conditions will it work? It would probably work under quite varied conditions, but to

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sum up, there are aids to *better work*. First, there should be a need for the dowsing. Then it should be specified just what it is you are trying to locate. There should be complete lack of fear or anxiety, plus an open mind about the method. At the very least, there should be a willingness to give it a chance—to "let it work." Also, a dowser gets better with practice, as he learns to just "let it happen."

Maybe all this talk about dowsing will make more of you readers curious enough to try it. You don't have to be a crackpot. Many ordinary, simple, common everyday people are using it. I'd like to hear from any readers who have used any kind of dowsing methods as approaches to problems, whether these were successful or not.

FLORENCE WORRELL
13010 Pierce Road
Saratoga, California 95070
An excellent summary of observed data!

Dear Mr. Campbell:

On Tissue Regeneration: A long time ago in *Scientific American* there was an article stating that if you amputate a frog's leg it does not regenerate, but if you run the sciatic nerve from the other leg down into the stump, the leg does grow back. Two or three years ago in *Science* a person said he had injected P^{32} in the brains of cats where it would get into the cell bodies for the 6th cranial nerve—but would not get spread around the cat. He found that the P^{32} migrated along the axon, and did not disperse into the body. After about ten days the P^{32} turned up inside the muscle which the nerve controlled. There might be a connection here.

JAMES F. CARTER
Stony Brook, New York 11790
Interesting!

Dear Mr. Campbell:

I have just read your April editorial advocating an approach to the solution of the problem of immune reaction to and rejection of organ transplants. For the last several years I have maintained that spare organs grown in vitro from samples of the recipient's own tissue was the only solution to the problem that would require no truly basic advance in our knowledge of human bio-chemistry. It may even be as your editorial indicates that this will be found to be the best and easiest method even after the mysteries of the immune reaction have been completely explored.

But why stop with re-growth in vitro of a patient's damaged organ whilst mechanical contrivances temporarily sustain him? Samples of all vital organs could be taken before damage from disease, accident or degeneration occurred and complete organs grown from them to be stored and maintained until they were needed. Thus if there were not enough of the right kinds of tissue left to sucessfully regrow the organ

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the patient would suffer no irreparable loss. Even brain tissue or entire brains might be cultured and implanted. If some method of recording and imprinting of memories and behavior patterns were evolved—that is if memories and behavior patterns are all there is to personality—then immortality of the "soul" as well as the body might be attained by this method. If the systems responsible for the immune reaction could be grown externally, they might be provoked into producing quantities of antibodies which could be used to supplement the body's normal production of them. If cancer tissue could be rendered particularly offensive to the immune system, we might be able to extract the specific cure appropriate to an individual cancer.

These methods can be developed within your and my lifetimes. They are not visionary or impractical. They will work as homografts and identical twin transplants have proved. I urge you, sir, and any other readers of this letter, to exert all your best efforts to insure that Mr. Campbell's proposal is adopted by some research agency competent in skill and financial endowment to pursue such research to a successful conclusion.

MARKHAM GREGORY ROBINSON
476 West Deodara Street
Vacaville, California

Sorry—your suggestion is visionary and impractical. If the cost of in vitro growth of an organ was ridiculously low, say one hundred dollars, how many vital organs are there? And how much would the necessary care and feeding cost per month? And given three billion people . . . !

Dear Mr. Campbell:

As a former student of Aikido I feel your readers might like to play with the following variant on the old "levitation" trick:

(1) Clench your right fist and extend your right arm straight out. Have someone try to bend your arm at the elbow, in the usual direction of bending. Tense arm, too, and think as hard as you like that he can't, even using two hands. It should still bend.

(2) Open your hand out, and try again. Relax your arm. Concentrate on the idea that your arm is like a hose with your mind flowing out it to the horizon. For some people this makes their arms unbendable.

Use GRADUAL force on the arms.

There are other such tricks but that's probably the simplest one. I doubt if it's due to PSI; however, whatever it is it is practical enough to be one base of this painful fighting art.

Happy arm bending.

P. A. GRAHAM
14 Clevedon Road
Papakura, New Zealand

Anybody want to test and report on this one?

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THE PARANOID REACTION

continued from page 7

In their legends, when Satan appears, he's a figure of fun being outcheated at his own game by some smart Irish lad. The dominant figures of Irish myth are the Leprechauns and the Fairy folk. Leprechauns are tricky fellows, always pulling sly jokes on some sober Irishman—or, if the Leprechaun decides to be helpful, he proves to be so stupid and misunderstanding that the befriended mortal would have done far better without him.

Essentially—that there are sly jokesters, and there are befuddled and stupid people, but there are no true, evil entities.

Result: The Irishman distrusts his friend not because he's an evil vampirelike being lurking to destroy, but because he's sure to turn out to be a joking trickster, or a hopeless muddlehead that ruins things by sheer stupidity. Distrust—but no hatred.

In essence—that there is no more *perversity* between men, than there is in inanimate objects. It made the Irish a happy, smiling, easy-going (but exceedingly stubborn!) people—but seriously interfered with cooperative organization, to the great disadvantage of Ireland down the centuries.

The tendency to impute malevolence is absolutely dominant in Balkan mythology, and almost totally absent from the Irish. The result is that neither cultural system produced an optimal working system.

Currently, strong strains of the Balkan-type paranoid "They're all against me for evil reasons!" is coming to dominate our own culture. The strong, highly effective individual is automatically distrusted—he *can't* be well-motivated *because* he's powerful.

One of the results of this is monumentally expressed in the unfinished skeletal framework of a new hospital in New York City. The area has badly needed a hospital for thirty years or more; the plans for the hospital were drawn up, and construction authorized some twenty-five years ago. The unfinished skeleton stands, and with reasonably good luck and effort, it may get into operation in another five years.

The trouble? Well, part of it is that since contractors are so distrusted, the City is required, by law, to make separate contracts with a series of separate contractors for structural work, for plumbing, electrical work, and so on for each individual specialty. Since they're operating completely independently, the coordination is terrible. If heating ducts have to go *there* but the heating contractor finds the plumbing contractor has installed a main sewer pipe in that space, they can't settle it on the job between themselves—they have to apply to the City.

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This discourages contractors. They'd prefer to work on some private contract with a little more integrated—and mutually-trusting! —organization. This slows things down on the City job. Since it's characteristic of all monetary units through all of history that the unit decreases in value over years, this means that the real-value cost of construction may be actually the same, but the number of dollars involved increases.

Hopefully, the hospital that was badly needed in 1938 will be in service before the first manned landings on Mars.

That paranoid reaction also shows up in government research, where every move made must be logically defensible whether it's good sense or not.

The last time someone involved in a government research program simply went ahead and did what needed to be done without bothering to make absolutely certain his position was thoroughly braced with red-tape justifications and bulwarked with legal decisions was when Franklin D. Roosevelt, without authorization of Congress, committed two billion dollars to a wild science-fiction idea called the Manhattan Project. He was able to do the job because Congress had trusted him to be a wise administrator, and given him an immense discretionary fund to work with—and he got away with it for the very simple and obvious reason that it worked.

The paranoid attitude hinders every phase of social organization when it runs wild—and, when it is totally absent, leads to disorganization.

Currently the most widespread form of that paranoia is the unshakable conviction on the part of a majority of Americans that manufacturers are automatically the root of all evil—greedy, ruthless, deliberately injurious.

I'm in a position to report—a quite painful report—on a magnificent example of the sort of "thoughtless thinking" that produces that conviction.

I have been most painfully poisoned by a commercial food product —in fact, by a series of them. Regular packaged foods being sold in supermarkets all over the country. I'm sure our friend Nader, and some of the more militant Food and Drug Administration people would be moved to swift punitive action.

It happens I have gout, a very ancient disease that's been laughed at for centuries—solely by those who haven't had it—and a very mysterious disease. Diet definitely has something to do with it—but just what is one of its mysteries. For one thing, it is not "rich living and port wine." Two dietary factors that turn out to be one hundred percent innocent are fats and alcoholic beverages. Matter of fact, in some hospital work with extreme

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obesity cases (I mean *extreme*—the 400-to-650-pound class!) the doctors put them on a diet of nothing but water and vitamin pills. Results proved conclusively that gout is caused by water and vitamin pills—because they developed gout!

Actually, the guilty food fraction seems to be proteins containing two particular amino acids—a purine ring molecule that, in slightly faulty metabolism, breaks down to uric acid, which crystallizes out in the joints. These particular amino acids—guanine and adenine—are two of the genetic-code substances by which biological information is stored and transmitted in DNA. It is found, therefore, in cells with a high concentration of information. Milk and dairy products contain none—they're strictly food. Pancreas (sweetbreads) and liver are high-concentration poison; those cells are chemical factories, manufacturing complex enzymes, and require an immense amount of information, and nothing much else. Muscle cells generally have little DNA: their business doesn't require a lot of information. An egg contains one minute packet of information in a large mass of usable energy-and-building material; eggs contain essentially zero purine.

When an attack comes on, you've got to steer clear of all purine foods. No meat, no fish—except, weirdly, caviar and shad roe! They're eggs, of course.

The actual diet list looks like something dreamed up by a wild-eyed fanatic with most whimsical theories. The particular variation between different organisms is wild and wonderful—with a resulting seeming non sequitur list.

Grains—except oats and whole wheat—are essentially non-purine and safe; something like white bread or cheese is fine.

So . . . in a recent attack, restricted to no meats, I tried a commercial meatless-sauce Spanish rice mix. The label listed the contents—no meat. It tasted fine.

Well, it did comply with the usual religious dietary rules of "meatless" meals—no animal protein.

And it fired up my foot but good. The manufacturer had sneaked one over on me—no doubt malevolently, evilly, ruthlessly!—by trying to improve his product. "Hydrolized vegetable protein," it seems, is added to give a satisfying meaty *flavor*, without violating religious dietary restrictions. The flavor comes from the same amino acids found in meat—including, of course, the ones that put redhot nails in my joint!

Is this truth-in-advertising, to say that that product was "meatless?"

Depends on what aspect of "meat" you're considering!

The next hard-way discovery I made has to do with one of the best pasta products on the market—spaghetti made with "enriched flour." They don't say just what it's enriched with, but do mention twenty percent more protein.

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I believe it's derived from wheat germ—the stuff that millers take out of wheat in making white flour, which I can tolerate, from whole wheat, which I can't.

The manufacturer has produced an improved, more nutritious, better-dietary-balance pasta at a somewhat increased cost—doing a better job for the buying public. Better . . . ?! Somebody dropped a flat iron on my toes.

Now if I reason on the basis of "I was hurt; that injury was caused by somebody else," it will be more comforting than to think "Dammit—having been bit once by 'hydrolized vegetable protein,' I should have wondered what that extra twenty percent protein was!"

Moreover, since a manufactured product was what injured me, clearly "that ruthless, wicked, evil money-hungry manufacturer had, without consideration of the buyer's welfare, put in substances that were toxic to me."

So he was trying to do a good job—which *was* good for practically every customer. If I happen to have a slightly weird metabolism, is that his fault?

As of now, I'm an attentive label-reader . . . which can sometimes be quite baffling. For instance, what ingredients hide behind the bland assurance that the contents are "Pure tomato catsup"?

All the howls about truth in advertising rest, fundamentally on distrust. Label a product "Contents: Hydrogen monoxide, carbonic acid, malic acid and mixed hexoses," and how much truth would most people abstract from that accurate and highly meaningful message? (But if it said "maleic acid"—?!)

The paranoid reaction—which is typified in some of the FDA's more egregiously doctrinaire decisions—louses up what can be the good and needed checks-and-balances of a sane and healthy culture.

The "information explosion" isn't just in technical literature—it's in everyday life, where no one not a specialized food chemist can keep up with the genuine and important advances in food chemistry as represented on your supermarket shelves.

But specialized information of certain sorts is needed; the diabetic gets such information, for example—as does the heart patient who needs a low salt diet.

The gout patient does not—so I have to find out by what my family knows as "the trial-and-ouch" technique.

But there's no point in blaming the manufacturers; gout is not a popular disease; I assure you it never will be. And who knows how many specialized conditions would require information; the can label would start reading like Vol. 12 of the Encyclopaedia Britannica if all conditions had to be mentioned.

Ask any good, red-hot allergy victim what evils lurk in the hearts of cans! ■ The Editor.

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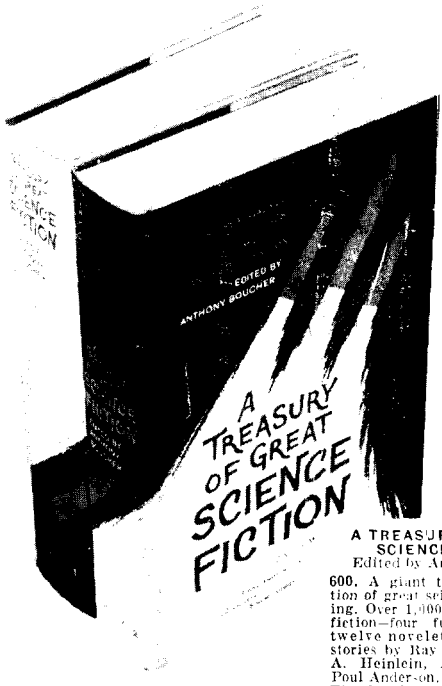

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